HEALTH ASPECTS OF PESTICIDES

abstract bulletin

January 1973 - Vol. 6, No. 1

Abstracts 73-0001-0256

HAPAB 06(01) 001-055 (1973)

ENVIRONMENTAL PROTECTION AGENCY

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OFFICE OF PESTICIDE PROGRAMS

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HEALTH ASPECTS OF PESTICIDES ABSTRACT BULLETIN is a monthly publication of the Technical Services Division of the Environmental Protection Agency.

The purpose of this publication is to foster current awareness of the major worldwide literature pertaining to the effects of pesticides on humans. The publication represents a monthly review of more than 1150 domestic and foreign journals. Subjects and authors of abstracted articles are cross-referenced in an annual index issue. Reprint requests should be directed to the author of the complete article.

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As of January 1, 1973, the price of subscriptions to the *Health Aspects of Pesticides Abstract Bulletin* for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 was increased. ***New*** subscription price, $11.50 a year, $3.00 additional for foreign mailing; price for a single copy, $1.00, Index issue, $2.25.

ERRATA

Eighteen English translations from *Hyg. Sanit.*, which referred to the original Russian articles previously abstracted from *Gig. Sanit.*, were cited in the December 1972 issue. In each case the pagination shown for these two journals was reversed; consequently, pagination shown for articles appearing in *Hyg. Sanit.* should be substituted with pagination shown for *Gig. Sanit.* and vice versa.

EXAMPLE

	From	To
72-2526	*Hyg. Sanit.* 14-17	*Hyg. Sanit.* 16-19
	Gig. Sanit. 16-19	*Gig. Sanit.* 14-17

This error was perpetuated in each of the following additional abstracts and should be corrected in the above manner:

72-2527	72-2570	72-2626
72-2528	72-2621	72-2627
72-2533	72-2622	72-2628
72-2534	72-2623	72-2705
72-2535	72-2624	72-2706
72-2536	72-2625	

73-0001. Janicki, K. (Hematol. Clinic, Inst. Intern. Med., Med. Acad., Kracow, Poland). **Leukemias in the Cracow region in the years 1961-1968 and contamination of the environment by pesticides.** *Acta Med. Pol. 13(1): 49-71; 1972.* (123 references)

Rectilinear correlations were calculated to determine the relationship between leukemia morbidity, based on hospital records, and extent of pesticide use, judged by distribution of chemicals in the district. The conclusions, based on three variants of morbidity and eight groups of chemicals, revealed significant relationships between the incidence of leukemia in rural areas and the distribution of herbicides and seed dressings. In 15 systems each of both rural and urban leukemia incidence and pesticides, significant multiple correlations were determined in six of the former and none of the latter. These statistics suggest that pesticides, especially herbicides and seed dressings, may act as promoters of leukemia.

73-0002. Raymond, R. L.; Jamison, V. W. (Sun Oil Company, Marcus Hook, PA). **Biochemical activities of *Nocardia*.** *Advan. Appl. Microbiol. 14: 93-122; 1971.* (100 references)

The utilization of hydrocarbons, nonhydrocarbon aromatics, herbicides, and steroids by aerobic, gram-positive members of the genus *Nocardia* is reviewed. A number of species of the genus have oxidized hydrocarbons including benzene, toluene, naphthalenes, and alkanes. With the exception of long-chain alkyl-substituted benzenes, hydrocarbons could not provide carbon and energy for growth. Among the nonhydrocarbon oxidations, dalapon was degraded 24% in eight days.

73-0003. Royal Swedish Academy of Sciences. (Stockholm, Sweden). **New journal announcement.** *Ambio 1(1): 1; 1972.*

Ambio is a bimonthly international journal published by the Royal Swedish Academy of Sciences and devoted to recent work in environmental management and technology and the natural sciences. Articles published in *Ambio* will be directed to a broad public comprising specialists in environmental fields, scientists in other fields, and the general public. Articles will be published in English. Initially, work originating in the Nordic countries will be emphasized, but the international aspects of environmental research will also be covered. *Ambio Special Reports* will be published separately and irregularly; publication of these reports will be announced in *Ambio*. Relevant articles and special reports from *Ambio* will be abstracted in *Health Aspects of Pesticides Abstract Bulletin*.

73-0004. Anonymous. **Triple rinse reduces the potential pesticide hazard.** *Amer. Fruit Grow. 92(8): 18; 1972.*

The National Association of Agricultural Chemicals suggests a procedure for reducing potential contamination of soil and water by pesticides remaining in used drums. Before the contents of the spray tank are diluted to the final volume, the pesticide container is allowed to drain 30 sec, rinsed three times with water or other diluting material used in the spray program, and allowed to drain 30 sec into the tank each time. One quart was recommended for the rinse of a one gallon can while five gallons was recommended for a 30- or 55-gallon drum. An inexpensive tool can be obtained for making a drain hole in the container to empty it of all material.

73-0005. Martens, P. (Chaire de Chimie analytique, Fac. des Sciences Agronomiques, Gembloux, France). **Incidences de l'utilisation des pesticides agricoles sur la pollution des eaux. [Water pollution hazards due to the use of agricultural pesticides.]** *Ann. Gembloux 77(1): 39-47; 1971.* (25 references) (French)

Hazards of pesticide-related water pollution and water pollution in different countries are described. Pesticides, especially herbicides, fungicides, and insecticides, are detrimental to surface waters and groundwaters through percolation and leaching. Pesticide-contamination of surface waters in the U.S.A. peaked in 1968: the Yakima River (Utah) contained 2,4-D in concentrations of 0.3 ppb; the communal water supply in a Florida city was endangered by the contamination of the ground-water with parathion. Elsewhere, endosulfan concentrations ranging from 0.020 to 2.7 ppb in the Rhine and Main Rivers caused massive fish death although an endosulfan concentration of 0.4 ppb caused no fish death in Indonesia.

73-0006. Alexander, M. (Lab. of Soil Microbiol., Dept. of Agronomy, Cornell Univ., Ithaca, NY). **Biochemical ecology of microorganisms.** *Annu. Rev. Microbiol. 25: 361-392; 1971.* (213 references)

Pesticide biochemistry elucidates how microorganisms contribute to environmental deterioration of pollutants. Several individual cultures metabolize DDT. *Hydrogenomonas* sp. effect initial steps of DDT degradation anaerobically and, with the addition of oxygen, cleave the ring and form *p*-chlorophenylacetic acid. Other microorganisms further degrade this product. Steps involved in the complete mineralization of 2,4-D have been established for *Arthrobacter*, but knowledge of metabolism in nature is lacking. Microorganisms are responsible for the release of metallic mercury from mercurials in soil. The metabolism of polluting chemicals in nature, natural selection, the effect of environment on microorganisms, the effect of microorganisms on their surroundings, and the biochemistry of interspecific relationships among microorganisms are also discussed.

73-0007. Koloff, W. J. (Salt Lake City, UT). **Insecticide spray.** *Arch. Intern. Med. 129(5): 834; 1972.* (4 references)

In a Letter-to-the-Editor concern is expressed about the consequences of spraying 2.5 million acres of land to control mosquitos which carry Venezuelan equine encephalomyelitis. The wisdom of using vast quantities of insecticide to control the spread of a virus which is deadly to horses, scarcely affects man, and for which a vaccine exists is questioned, as is the authority of the USDA to spray at will.

73-0008. Anonymous. **Greener pastures for pesticides overseas?** *Chem. Week 110(11): 27-28; 1972.*

U.S. pesticide producers are urging the expansion of overseas markets because of a current lag in pesticide sales at home. In addition, the non-Communist world pesticide market has climbed to more than one billion dollars at the manufacturers' level and is expected to grow spectacularly in developing areas within the next few years. The Middle East and India have the potential to grow faster than any other world markets because industrial growth is boosting the demand for farm products and cutting the labor force. Educational campaigns by the International Rice Research Institute (IRRI) are alerting farmers to the potential profit from controlling pests with chemicals. In selling pesticides to developing areas, two problems arise: strong competition from Japanese and European countries; and the non-mechanization of agriculture which minimizes the need for herbicides, the largest group in the U.S. pesticide market. To increase overseas sales U.S. companies must increase production of insecticides and fungicides and provide greater adaptation to local conditions.

73-0009. Poulsen, E. (Inst. for Toksikologi, Statens Levnedsmiddelinstitut, Copenhagen, Denmark). **Om toksikologisk vurdering af risikoen ved tilsaetningsstoffer og forureninger i levnedsmidler. [On the toxicological assessment of the hazards of food additives and impurities.]** *Dan. Kemi 52(6): 81-85; 1971.* (Danish)

Problems of assessing the actual and potential hazards of food additives and contaminants are reviewed and occurrences mentioned. Hazards of food additives and contaminants and relationships between the presence of residues and harmful effects can be approached through epidemiology, analysis, and toxicology. Massive poisoning due to endrin-contaminated grain and flour occurred in Wales. Grain and flour contaminated with parathion during shipment caused massive poisonings in three Latin American countries in 1967: Dominican Republic–21 died out of 27 cases; Mexico–500 taken ill, 16 died; Colombia–63 out of 165 persons treated died. High DDT, PCB, and mercury contents in fish caught in the North Sea and off Swedish islands forced a sales ban.

73-0010. Ferguson, F. F. (San Juan Lab., Ecological Investigations Programme, Old San Juan, Puerto Rico, 00902). **Some current controls for aquatic weeds inimical to public health.** *East Afr. Med. J. 48(8): 456-459; 1971.*

A brief survey of the methods of aquatic weed control and their use in waterways, irrigation ditches, reservoirs, and lakes is presented. Before the introduction of herbicides, manual devices such as chain drags and serrated metal stripping partially controlled aquatic weeds. Other methods were designed to change the environment of weeds–the use of steep bank slopes on farm ponds and treatment of water with chemical fertilizers to encourage plankton growth. Among the chemical herbicides commonly used, only 2,4,5-T is restricted. In the U.S. it may not be used to control weeds in municipal water supply reservoirs. Diquat is effective and less harmful than 2,4-D to economic crops. Problems encountered in chemical control methods are proper choice of chemical, confinement of treatments, optimal dispersion of materials, toxicity, and possible poisoning of water supplies. Since some success has been achieved with biological controls, a combination of quick weed kills and biological control should be investigated.

73-0011. McIntire, G. (Washington Univ., St. Louis, MO). **Spoiled by success.** *Environment 14(6): 14-29; 1972.* (37 references)

DDT's success against typhus and malaria during World War II was the basis for large-scale production and use. Since there were no government regulations other than labeling requirements and the compound appeared to have low human toxicity, the public accepted the endorsement by industry and agriculture and ignored warnings from the scientific community. Household and farm use was promoted and health officials began widespread use of the compound for control of disease vectors. Government spraying projects were initiated to control pests of economic importance. Soon after introduction of DDT, drastic changes in pest populations were noted because of the effect on beneficial predators and parasites; resistant strains developed. Accumulation in animal fat and milk was observed. The Miller Pesticide Residue Amendment to the Food, Drug and Cosmetic Act was passed in the early 1950s; tolerance levels of pesticides in foods were established by the FDA although compounds of unknown toxicity remained on the market. Public concern subsided until the publication of Rachel Carson's *Silent Spring*.

73-0012. Ferguson, D. E. (Malheur Environ. Field Station, Burns, OR). **The new evolution.** *Environment 16(6): 30-35; 1972.* (18 references)

About 224 species of pest insects and mites in

many parts of the world have developed resistance to one or more groups of insecticides; resistant strains of nontarget organisms such as beneficial insects, fish, crustaceans, amphibians, and some mammals have also developed from the non-specific use of pesticides. With the development of such resistance, the diversity of a given species is reduced and the process of natural selection altered. Since genes conferring resistance assume primary importance at the expense of genes concerned with environmental adaptation, the existence of a species becomes tenuous. In a laboratory experiment on the tolerance of resistant mosquitofish to large concentrations of chlorinated hydrocarbons in their tissues, most of the potential predators died within 24 hr. Sublethal concentrations of pesticides can decrease reproduction and affect normal physiological functions and behavior in many animals. It has been reported that a lethal microsporidian parasite has invaded the CNS of fish whose resistance has been lowered due to exposure to 2,4-D and carbaryl for 1 to 5 months.

73-0013. Ogata, I. (Dept. of Environ. Biol., Cent. of Environ. Sanitation of Japan, Tokyo, Japan). **[Merits and demerits of DDT from the viewpoint of sanitation.]** *Gekkan Yakuji (Pharm. Mon.) 14(9): 1788; 1972.* (Japanese)

The use of DDT in Japan is reviewed, principally from the viewpoint of environmental sanitation. The major detrimental effects of DDT are its persistence in humans and its possible induction of hepatoma, nonregenerative anemia, and leukemia due to the damage of bone marrow or the triggering of hepatosis, liver cirrhosis, nephritis, and renal failure. Although DDT has decreased the population of fresh-water fish and birds of prey, it has also been responsible for the complete control of typhus epidemics which raged after World War II. The number of typhus patients in Japan was zero in 1938, 32,666 in 1946, and zero again in 1953 after DDT use. DDT has also helped the anti-malarial campaign waged by the Department of Public Sanitation. Although malaria has never been rampant in Japan, the number of patients in Taiwan was over a million in 1952 and decreased to only 1000 after four years of residual spraying of DDT. WHO insists on using DDT against malaria, hopefully with a method which will not cause environmental contamination. Unfortunately, the insects most detrimental to public health such as mosquitos, flies, German cockroaches, and other agricultural pests have developed resistance to DDT. Therefore, the Ministry of Public Welfare banned organochlorine insecticides such as DDT, BHC, chlordane, and dieldrin after the development of organophosphorus insecticides and pyrethroid substitutes for DDT.

73-0014. Grushko, Ya. M. (Dept. of Gen. Hygiene, Irkutsk Med. Inst., Irkutsk, USSR). **Toksicheskiye veshchestva organicheskogo proiskhozhdeniya v promyshlennykh vodakh i problema sanitarnoy okhrany vodoyemov. [Organic toxic matter in industrial effluents and the problems of water pollution prevention.]** *Gig. Sanit. 36(10): 82-85; 1971.* (23 references) (Russian)

General problems of water pollution caused by organic toxic substances such as detergents, pesticides, and industrial chemicals present in effluents and runoff water are outlined. Since the biochemical oxidation of organic toxic residues by microorganisms is only partial, such residues inhibit the autopurification of water. Hydrochemical and hydrobiological processes may cause considerable changes in both the composition and the toxicity of the original toxic substance, as with malathion which hydrolyzes into more toxic products. Summation of the toxic effects of pesticides was determined with increased concentration. The maximum allowable concentrations in water in the U.S. are: 0.017 mg/l. for aldrin and dieldrin; 0.003 mg/l. for chlordane; 0.042 mg/l. for DDT; 0.001 mg/l. for endrin; 0.018 mg/l. for heptachlor and heptachlor epoxide; 0.056 mg/l. for lindane; 0.035 mg/l. for methoxychlor; 0.1 mg/l. for carbamate; and 0.005 mg/l. for toxaphene. The DDT concentrations exceeded a value of 45 mg/l. in 99% of a total of 590 water samples investigated in the U.S.

73-0015. Sakharov, Yu. I. (A. N. Sysin Inst. of Gen. and Communal Hygiene, Acad. of Med. Sci. USSR, Moscow, USSR). **O kriteriyakh gigiyenicheskoy otsenki bytovykh khimicheskikh veshchestv. [Criteria of the hygienic assessment of household chemicals.]** *Gig. Sanit. 37(4): 40-44; 1972.* (24 references) (Russian)

Criteria of the hygienic assessment of household chemicals such as detergents, solvents, paints, and pesticides are outlined regarding elimination of all acute and chronic hazards and possible side-effects. The general toxicity of household chemicals should be studied in acute and chronic experiments with special emphasis on possible allergenic, carcinogenic, co-carcinogenic, gonadotropic, embryotoxic, and sensitizing properties. If any chemical intended for household use proves to be toxic in acute or chronic experiments or is found to have carcinogenic, co-carcinogenic, allergenic, or gonadotropic effects, its production should be prohibited.

73-0016. Savage, E. P.; Tessari, J. (Inst. Rural Environ. Health, Colorado State Univ., Ft. Collins, CO). **PCB's and the environment.** *J. Environ. Health 35(1): 30-34; 1972.* (25 references)

Polychlorinated biphenyls (PCBs) are widely distributed, persistent, stored in tissue, and concentrated in the food-chain like DDT. Their toxicity is not fully understood. Mortality from PCBs has been observed in rats, chickens, mice, rabbits, guinea pigs, fish, and juvenile pink shrimp. Toxicities appear to be proportional to

the chlorine content. Work in rats has shown that PCBs induce microsomal enzymes and possibly bring about steroid degradation. The two direct actions in man are acute yellow atrophy of the liver and a skin effect. Sublethal concentrations increased susceptibility of ducks to hepatitis virus. Gas chromatography is generally used for detection of PCBs although their peaks often coincide with those of the organochlorines; analysis by TLC and MS is used for confirmation. Levels have been reported in human milk samples from Colorado and California and in human plasma collected in South Carolina.

73-0017. Anonymous. **Fetotoxicity.** *N. Z. Med. J. 75(480): 304-305; 1972.* (10 references)

In a discussion of fetotoxicity, 2,4,5-T is used as an example of a widely used chemical which contains a contaminant, dioxin, known to be extremely toxic to laboratory fetuses. In New Zealand where 2,4,5-T has been used for 20 yr, no known cases of malformation in man were reported until recently. The report suggesting fetotoxicity in humans includes no common patterns of malformation as is observed with other fetotoxic agents. To insure safety Britain has set the limits of dioxin in 2,4,5-T at 0.1 ppm. The herbicide, as well as drugs and other agents known to be fetotoxic, should and can be avoided by pregnant women. It is unlikely that 2,4,5-T could contaminate ground water in sufficient quantities to cause trouble. Less sensational reporting and more accurate record keeping at all stages of pregnancy are needed to resolve the problems of fetotoxicity.

73-0018. De Tempe, J. (Official Seed Testing Station, Wageningen, The Netherlands). **The seed testing station's role in the testing of fungicides.** *Neth. J. Agr. Sci. 20(2): 76-80; 1972.* (3 references)

At present mercurial fungicides are being replaced by other compounds because mercurials are broad spectrum poisons. Some resistance to them has been noted and, although they are good disinfectants, they do not have good protective activity. Also, occupational deaths have occurred accompanying their use. Although the oxathiines such as carboxin can fulfill requirements for activity, they act mainly on Basidiomycetes, which cause a minority of fungal diseases; carbamates are usually more effective against Ascomycetes and Fungi imperfecti than newer systemic fungicides. Effective treatment of smut at an early stage can eliminate use of large amounts of fungicide at later stages and thus pollution of soil and water.

73-0019. Billon, J. (Lab. des Abattoires de La Villette. Direction des Services veterinaires de Paris, Paris, France). **Methodes pour la mise en evidence de substances et de residus toxiques ou teratogenes dans les produits alimentaires. [Detection of toxic or teratogenic residues in food products.]** *Rec. Med. Vet. 147(11): 1259-1272; 1971.* (12 references) (French)

The need for research on the effect of using modern techniques of production and preservation of foods of animal origin (such as irradiation, additives, residues) is emphasized and a systematic program for investigation proposed. It uses three generations of rats and includes studies on acute and chronic toxicity, teratogenicity, fertility, growth, and development.

73-0020. Dabija, G.; Nemteanu, S.; Adamescu, G. (Inst. de Cercetari Veterinare si Biopreparate "Pasteur," Bucharest, Rumania). **Problema reziduurilor de pesticide in alimentele de origine animala. [The pesticide residue problem in foods of animal origin.]** *Rev. Zooteh. Med. Vet. 21(11): 59-64; 1971.* (28 references) (Rumanian)

Hazards due to pesticide residues in food and control activities providing legislation for the safety of agricultural organochlorine and organophosphate application are reviewed. Maximum allowable organochlorine, organophosphate, carbamate, and organomercurial residue limits in milk, dairy products, and meat, established by the WHO and FAO are tabulated. Reference is made to research in food product contamination performed in Italy and Great Britain. Legislation in Sweden has abolished the use of DDT since 1968, while in Switzerland organochlorines such as lindane and carbamates such as Landrin are no longer used. The recent trends in Rumania focus on the substitution of organochlorines by organophosphates, the latter being considered less hazardous because they do not accumulate. The need for legislation in terms of agricultural pesticide application and public health safety and international trade is emphasized. An authority coordinating the economical and safety aspects of the pesticide industry, agriculture, veterinary medicine, and public health control should be instituted.

73-0021. Lellinger, D. B. (U.S. National Herbarium, Smithsonian Inst., Washington, DC 20560). **Dichlorvos and lindane as herbarium insecticides.** *Taxon 21(1): 91-95; 1972.* (12 references)

In response to an article suggesting the use of lindane and dichlorvos as protectants in herbarium cases, the hazards of such use are reviewed. Since lindane is persistent and levels present in the cases would greatly exceed threshold limits which were based only on short term effects, its use is not recommended. Dichlorvos, although acutely toxic, is degraded and rapidly eliminated from the human body; that its effect on ChE is additive with those of other organophosphates should be considered. Experience in the U.S. National Herbarium indicates that even under adverse conditions, periodic fumigation is sufficient to prevent infestations. Use of dichlorvos as a space treatment would be less hazardous and as effective as protectants in herbarium cases.

73-0022. Ravera, O. (Ispra Establishment, Joint Research Centre, Commission of European Communities, Ispra, Italy). **Water, water everywhere, nor any drop to drink....** *Eurospectra 11(2): 34-46; 1972.* (20 references)

When ascertaining the lower limits of human tolerance to pollutants, an investigation of water pollution should include studies in biology, morphometry, hydrology, water chemistry, and climatology, and ones on the sedimentological characteristics of the polluted water. For the specification of "limits," the scope of the experiments should be extended to identify organisms (or stages in their development) which are highly sensitive, typical of various environments (e.g. littoral, pelagic, and deep-water), and readily usable as toxicity indications. To assess the noxiousness of an element in the environment, the overall concentration, the concentration of its compounds, and its physical form (in terms of oxidation potential) are needed. Proposed tolerance limits for Italian waters are tabulated for various metals, oils, detergents, free and combined chlorines, phosphorus derivatives, pesticides, arsenic, cyanides, hydrogen sulfide, and carbon disulfide. The hazard due to a pollutant depends on toxicity, concentration, and degradability.

73-0023. Persson, B. (Dept. of Animal Ecol., Univ. of Lund, Lund, Sweden). **DDT content of whitethroats lower after summer stay in Sweden.** *Ambio 1(1): 34-35; 1972.* (10 references)

Swedish whitethroats caught in the spring, just after return migration to Sweden, had significantly higher concentrations of chlorinated hydrocarbons than whitethroats caught in late summer just prior to migration south. Detectable amounts of PCB, *p,p'*-DDT, and lindane were observed in breast muscles in birds sampled in August. The average value of total DDT was 1.63 ppm, about 12% of which was *p,p'*-DDT. Birds sampled in the spring had higher concentrations of all hydrocarbons, and more variation was observed. The total DDT value was 5.20 ppm, about 21% occurring as *p,p'*-DDT. It appeared as if the birds had ingested DDT in northern Africa and southern Europe during migration.

73-0024. Tilemans, E. (Fac. des Sci. Agronomiques de Gembloux, Gembloux, France). **La pollution du sol par les insecticides. [Soil pollution due to insecticides.]** *Ann. Gembloux 77(3): 195-206; 1971.* (French)

The action and persistence of insecticides are reviewed. Volatilization, oxidation, hydrolysis, and microbial activity; soil type, pH value, organic content, and moisture content; and the solubility, concentration, and chemical formula of the preparation influence insecticide decomposition and persistence. The soil organic content and the moisture content have a positive effect on the persistence by increasing the adsorption and reducing the evaporation of the insecticides. Iron, aluminum, and magnesium favor the adsorption while temperatures enhance the volatilization and light catalyzes the decomposition of pesticides. Granulated insecticides are more persistent than emulsions or powders; insecticides in heavy, clayey soils are most persistent. Frequent harrowing may reduce the residue contents in the soil by 25-40%. Readily soluble insecticides are leached out and retained by soil particles. Insecticides can be absorbed by plants independently of water. The residue levels are highest in the roots of plants due to the direct contact with the polluted soil. Organochlorine pesticides such as DDT, aldrin, dieldrin, and lindane are more persistent than organophosphorus products which remain in the soil over a few months; DDT has a half-life of three years.

73-0025. Warnick, S. L.; Carter, J. E. (Utah Community Study on Pestic., Dept. of Social Services, Div. of Health, Salt Lake City, UT). **Some findings in a study of workers occupationally exposed to pesticides.** *Arch. Environ. Health 25(4): 265-270; 1972.* (6 references)

Men who have moderate occupational exposure to pesticides were selected as subjects for these long-term studies. The results of a series of clinical and biochemical tests are compared with those of a closely matched control group. No effects of clinical significance were observed in the occupationally exposed men despite increased storage of pesticides in their bodies. A number of seasonal, occupational, clinical, and biochemical variations between the two groups are reported. The differences are slight and of questionable significance to health, whether associated with pesticides or not. Abnormalities may be discovered as research is continued, testing procedures refined, and additional parameters investigated. (Author abstract by permission)

73-0026. Zwolinska-Sniatalowa, Z.; Narkiewicz-Jodko, J. (Plant Protection Inst., Poznan, Poland). **Pozostalosci niektorych insektycydow fosfoorganicznych stosowanych doglebowo w warzywach. [Residues of some organophosphorus insecticides in vegetables after application into soil.]** *Biul. Inst. Ochr. Rosl. 4: 439-448; 1971.* (12 references) (Polish)

Between 1965 and 1969, disulfoton (Solvirex 5, Solvirex 10, and Disyston Granulat) and diazinon (Basudin 10 Granulat and Basudin 50 Saatbeizmittel) were applied to soil at 20-35 kg/ha, at 0.25-1.0 g/plant, or to roots of plants in the form of a paste (Basudin 50:4 g/l. paste) prior to planting. Residues of the pesticides were determined colorimetrically in different varieties of cabbage, onion, and red beets several weeks after harvest. The disulfoton residue content differed depending on the preparation used: with Solvirex residues it varied between 0.19 ppm (0.25 g/plant) and 0.37 ppm (1 g/plant), indicating a concentration relationship. Residues after application of Disyston varied between 0.0 and 0.04 ppm (30-35 kg/ha) or 0.1 ppm (1 g/plant). Diazinon residues (in cabbage) were very low, ranging from 0.033 to 0.099 ppm. These low values indicate that fear of residues of these insecticides in vegetables after soil treatment is apparently unwarranted.

73-0027. De Pontanel, H. G.; Astier-Dumas, M.; Gulat-Marnay, C.; Jacquet, J.; Hau, H. C.; Boutibonnes, P.; Custot, F.; Mezonnet, R. (Centre de Recherches Foch, Paris, France). **Problemes hygieniques poses par la carotte, particulierement dans l'alimentation du jeune enfant (methemoglobinemie, residus d'insecticides). [Hygienic problems of carrot, with special regard to its use in baby foods (methemoglobinemia, insecticide residues).]** *Bull. Acad. Nat. Med. (Paris) 155(5): 82-99; 1971.* (28 references) (French)

The problem of nitrate and nitrite contents and insecticide residues in carrots is reviewed. Carrot samples analyzed generally contained small amounts of lindane, aldrin, and dieldrin residues with some 30% of all samples containing considerable amounts. The organochlorine pesticide residues accumulated mostly in the outer parts of the root. Seventy-six percent of 95 carrot samples grown in the Paris region contained zero or less than 0.01 mg lindane/kg. The residue contents were:

0.01-0.05 mg/kg in 8%; 0.05-0.1 mg/kg in 13%; 0.11 mg/kg in 1%; and 0.28 mg/kg in another 1% of the samples. Eighty percent of the samples contained zero or less than 0.01 mg aldrin/kg, while 17% contained 0.01-0.5 mg/kg, and 1% had 0.05 and 0.06 mg/kg, respectively. The percentages of samples containing dieldrin residues below 0.01 mg/kg, of 0.01-0.05 mg/kg, and of 0.05-0.20 mg/kg were 73%, 22%, and 5%, respectively.

73-0028. Joiris, C.; Martens, P. (Centrale Ornitologique AVES, Brussels, Belgium). **Teneur en pesticides d'oeufs de rapaces recoltes en Belge en 1969. [Pesticide residue contents in raptorial birds' eggs collected in Belgium in 1969.]** *Bull. AVES 8(1): 1-13; 1971.* (10 references) (French)

Twenty-nine unhatched eggs of seven raptorial species were collected from 15 different points in the southern part of Belgium in 1969 for organochlorine pesticide residue determination by gas-chromatography. Alpha, delta, and gamma BHC (lindane), heptachlor, heptachlor epoxide, aldrin, dieldrin, DDT, *p,p'*-DDT, DDE, and TDE were present in most eggs; one egg contained 0.01 ppm beta BHC. The total organochlorine pesticide residues in two *Buteo buteo* eggs was 0.18 and 0.59 ppm, respectively, and three *Accipiter nisus* eggs contained residue levels of 5.55, 12.58, and 1.39 ppm. The residue content in one *Falco tinnunculus* egg was 0.25 ppm, and the average for three *Tyto alba* eggs was 0.43 ppm. Six *Aegolius funereus* eggs, collected from two nests, contained residues of 0.52 and 0.32 ppm. The residue level in one *Athene noctua* egg was 0.82. The residue contents in nine *Strix aluco* eggs ranged from 0.19 to 1.30 ppm. The residue levels were highest in eggs of species which mostly feed on other birds' eggs.

73-0029. Prati, L.; Pavanello, R.; Ghezzo, F. (Inst. of Hyg., Univ. of Ferrara, Ferrara, Italy). **Storage of chlorinated pesticides in human organs and tissues in Ferrara Province, Italy.** *Bull. WHO 46(3): 363-369; 1972.* (7 references)

During an investigation of organochlorine residues in human tissue of residents of Ferrara Province, Italy, DDT and its derivatives were found more frequently and at higher concentrations than other compounds. Heptachlor epoxide was present in most samples of fat and liver; dieldrin occurred chiefly in the fat; *p,p'*-DDE was always found in fat and liver, often in spleen, and with moderate frequency in kidney and brain; *p,p'*-DDT was present in most fat samples, in many liver and kidney samples, and seldom in brain and spleen samples. Residues in nonfatty tissues were always much lower than those in fatty tissue. A comparison of these results with those of other studies indicates a relatively high level of organochlorine residues in residents of Ferrara Province; the amount of hydrocarbons used in agriculture there is among the highest in Italy.

73-0030. Massaux, F. (Lab. des Radio-isotopes, Ecole Federale Superieure d'agriculture du Cameroun, Cameroon). **Etude des residus de chlorure de triphenyletain (Brestanol ^{113}Sn) sur feves de cacao. [Study of triphenyltin chloride (Brestanol ^{113}Sn) residues in cocoa beans.]** *Cafe Cacao The 15(3): 221-234; 1971.* (13 references) (French)

Studies of ^{113}Sn-labeled triphenyltin chloride (Brestanol) residues in soil, cocoa plants, and beans are described. Thin-layer chromatography was used to separate and determine the metabolites. The investigations revealed that Brestanol has no significant systemic action on plants via leaves and roots. Although the rate of mineralization of Brestanol is very high in the soil, with 99% in one week, the rate decreases when Brestanol is applied to leaves and cocoa shells. The proportion of the organotin content in beans decreases from 73% in fresh to 2.3% in roasted beans, and the organotin content in commercial cocoa beans is 0.005 ppm. The organotin contents in cocoa shells range from 1 to 4 ppm and are 0.02 ppm in shell meal, which may be used at 5-10% in livestock feed. The identical chromatographic behavior of organotin chloride, hydroxide, and acetate suggests similarities in their respective modes of action and mineralization.

73-0031. Castle, W. T.; Woods, Jr., L. A. (Wildl. Manage. Branch, Calif. Dept. of Fish and Game, CA). **DDT residues in white croakers.** *Calif. Fish Game 58(3): 198-203; 1972.* (10 references)

GC analysis indicated that DDT residues in white croaker from Los Angeles-Long Beach Harbor were higher than those in croaker from other areas. The high residues may be attributed to past contamination of the harbor by a DDT manufacturing plant. Significant differences were observed between total DDT residues in flesh (10.82 ppm) and flesh with skin (18.23 ppm). The fat content of the flesh with skin was significantly higher than that of flesh alone. Many of the samples analyzed had residues higher than the U.S. Food and Drug Administration recommended tolerance of 5.0 ppm.

73-0032. Skoblin, A. P.; Zakordonets, V. A.; Skoblina, L. P.; Drozdova, O. A. (M. V. Frunze Crimean Pedagogical Inst., USSR). **Ob effektivnosti gerbitsida prometrina. [On the effectiveness of prometryne.]** *Dokl. Vses. Akad. Sel'skokhoz. Nauk 5: 16-17; 1972.* (4 references) (Russian)

The accumulation of prometryne was studied in crops and leaves of carrot and potato. Prometryne at 2 and 4 kg/ha was sprayed on the soil surface 3-4 days prior to sprouting. Residues in leaves and crops were determined several times during the vegetation period by thin-layer chromatography. Prometryne residues detected in small amounts in carrot, particularly during the initial stage of the vegetation period, disappeared by

the end of the period. Prometryne was found in large amounts in potato peelings during most of the vegetation period up to harvest; peeled potatoes contained no traces at any stage.

73-0033. Mullison, W. R. (Ag-organics Dept., Dow Chemical, Midland, MI 48602). **Ecological effects of herbicides.** *Down Earth 28(2): 21-24; 1972.*

Important factors determining ecological damage by herbicides are method of application and compound volatility. Low volatile esters of 2,4-D, such as the polypropylene glycol butyl ether esters and the isooctyl esters, have helped reduce damage. Use of coarse sprays and low pressure, at low but not zero wind velocity, and 5 to 10 ft above the crop if aircraft are used; use of thickening agents; and avoidance of spraying near actively growing, sensitive crops reduce spray drift hazards. Movement of herbicides in soil generally is not hazardous since adsorption onto clay particles and absorption into plants occur rapidly. Herbicides, in general, break down in the soil within several months. Effects on lower forms of plant life are considered only temporary. Although formulation ingredients may be more toxic than the active compound, most herbicides have low toxicity to fish. The factor determining whether or not herbicides will have a beneficial or harmful ecological effect is the wisdom with which they are used.

73-0034. Cliath, M. M.; Spencer, W. F. (U.S. Dept. of Agr., Agr. Res. Service, Soil and Water Conserv. Res. Div., Univ. of California, Riverside, CA 92502). **Dissipation of pesticides from soil by volatilization of degradation products. I. Lindane and DDT.** *Environ. Sci. Technol. 6(10): 910-914; 1972.* (16 references)

Volatility of the primary degradation products of lindane and DDT were compared with volatility of the parent compounds. The primary degradation products of lindane and DDT–PCCH (pentachlorocyclohexene) and DDE–have much higher vapor pressures than the parent compounds. At 30°C, the vapor density of PCCH was 13.7 times that of lindane; the vapor density of *p,p'*-DDE was eight times that of *p,p'*-DDT. With lindane calculations verfied by laboratory or field measurements of relative volatility indicate that two thirds to three fourths of the volatilized material is lost as PCCH from a calcareous soil. Field measurements of atmospheric concentrations of DDT compounds agreed with predictions of relative volatility from laboratory vapor density measurements. Sixty-six percent of the total DDT atmosphere over a field containing residual DDT was *p,p'*-DDE. This means that most of the *p,p'*-DDT now present in well-aerated soils probably will be volatilized as *p,p'*-DDE. The presence of degradation products in significant amounts in field soils indicates that volatilization of degradation products, such as PCCH and DDE, can be a major pathway for loss of some organochlorine insecticides from soil. (Author abstract reprinted by permission of the American Chemical Society)

73-0035. Albone, E. S.; Eglinton, G.; Evans, N. C.; Hunter, J. M.; Rhead, M. M. (Organic Geochem. Unit, Sch. of Chem., Univ. of Bristol, Bristol, BS8 1TS, England). **Fate of DDT in Severn estuary sediments.** *Environ. Sci. Technol. 6(10): 914-919; 1972.* (33 references)

The functions of estuarine sediments as pollutant sink and as pollutant bank are assessed in relation to the fate of DDT in the environment. *p,p'*-DDT was degraded more slowly when incorporated in situ in Severn estuary sediments than when incubated in sediment samples maintained under hydrogen in the laboratory. These transformations are compared with the more extensive degradation of DDT on incubation in anaerobic sewage sludge. In all incubations metabolites included *p,p'*-DDD (TDE). The wider application of the techniques developed is discussed. (Author abstract reprinted by permission of the American Chemical Society)

73-0036. Masterton, W. L.; Lee, T. P. (Dept. of Chem., Univ. of Connecticut, Storrs, CT 06268). **Effect of dissolved salts on water solubility of lindane.** *Environ. Sci. Technol. 6(10): 919-921; 1972.* (7 references)

The effect of 14 different 1:1 salts on the water solubility of lindane (±-hexachlorocyclohexane) has been measured. In 10 cases salting out is observed; the greatest decrease in solubility is found with the alkali fluorides, KF and NaF. The four electrolytes that salt in lindane [NaI, KI, $(CH_3)_4NCl$, $(C_2H_5)_4NCl$] are ones containing large ions. The order of the Setschenow parameters calculated from solubility data for lindane parallels that for benzene. Except for the fluorides, the extent of salting out is less for lindane than for benzene. (Author abstract reprinted by permission of the American Chemical Society)

73-0037. Gzhegotskiy, M. I.; Moroz, A. M. (Lvov Med. Inst., Lvov, USSR). **Nakopleniye, tsirkulyatsiya i stoykost' gerbitsidov vo vneshney srede. [Accumulation, circulation and stability of herbicides in the environment.]** *Feldsher Akush. 37: 6-9; 1972.* (Russian)

The accumulation, circulation, and stability of herbicides in the environment and results of residue determinations are reviewed. Herbicides may accumulate in the soil, be leached out by ground water, taken up by plants, and finally consumed by man in vegetable products. The reduction of herbicide toxicity and their accumulation in the soil are dependent on soil temperature, moisture content, evaporation, leaching, depth of penetration, the soil structure, and inactivation by microorganisms and plants, to name a few. The inactivation by plants occurs primarily through complex

formation. Although diuron and neburon are resistant to leaching, most of the organochlorine herbicides are leached out readily. Urea and aliphatic acid derived compounds preserve their toxicity from several months to four years; intermediate metabolites of diuron can be detected in the soil over 4-8 years. Prometryne decomposes slowly to form sulfoxy and sulfo analogs whereas 2,4-D and 2,4,5-T accumulate in plant tissues and hydrolyze after a certain time. Dalapon residues of 5-10 mg/kg in leaves and 2.5-8 mg/kg in wine grapes were determined from vines grown in soil treated with 5-10 mg/kg.

73-0038. Gabrilevskaya, L. N.; Laskina, V. P. (Dept. of Communal Hyg., First Moscow I. M. Sechenov Med. Inst., Moscow, USSR). **K voprosu ob usloviyakh spuska stochnykh vod proizvodstva Prometrina v vodoyem. [The problem of conditions of discharge into a water body of prometryne production effluents.]** *Gig. Sanit. 37(3): 18-21; 1972.* (3 references) (Russian)

Effluents from prometryne production were analyzed, and investigations were carried out for determination of the maximum allowable concentrations of specific components of the effluent (prometryne, propazine, sodium methylmercaptide, and sodium methylsulfonate) for a proposed effluent treatment method. The method is based on the elimination of odor mainly by removing sodium methylmercaptide. The effluent has a strong mercaptan odor, contains considerable amounts of chlorides, and is highly alkaline. The maximum allowable concentrations of prometryne and propazine in water are 3 mg/l. and 1 mg/l. The highly poisonous sodium methylmercaptide impairs both the hygienic and the organoleptic properties of water, has an odor threshold of 0.001 mg/l., a no-effect level of 0.02 mg/l., and a maximum allowable concentration of 0.001 mg/l. Since it is present in the effluent in a concentration of 51,000 mg/l., a prohibitively high degree of dilution by a factor of 40 million would be necessary. The maximum allowable concentration of sodium methylsulfonate, determined from complex hematological and morphological investigations in an 8-month animal experiment, is 3 mg/l.; the LD50 value is 15,000 mg/kg. Since its concentration in the effluent is 50,000 mg/l., dilution by a factor of 20,000 would be necessary. As the treated effluent requires dilution by a factor of 1,000, the suggested chemical treatment method is not practical for extensive use.

73-0039. Borisenko, N. F.; Cherpak, V. V. (Dept. Occup. Health, Kiev Med. Inst., Kiev, USSR). **Comparative hygienic characteristics of certain methods and machines used in disinfection of seeds.** *Hyg. Sanit. 35(12): 317-320; 1970.* (5 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 35(12): 14-16; 1970, see Abstract no. 71-2637.

73-0040. Moilanen, K. W.; Crosby, D. G. (Dept. of Environ. Toxicol., Univ. of California, Davis, CA 95616). **Photodecomposition of 3′,4′-dichloropropionanilide (propanil).** *J. Agr. Food Chem. 20(5): 950-953; 1972.* (15 references)

The action of sunlight on dilute aqueous solutions of 3′,4′-dichloropropionanilide (propanil) provided a large number of photodecomposition products separable by gas chromatography. 3′-Hydroxy-4′-chlorpropionanilide, 3′-chloro-4′-hydroxypropionanilide, 3′4′-dihycroxypropionanilide, 3′-chloropropionanilide, 4′-chloropropionanilide, propionanilide, 3,4-dichloroaniline, 3-chloroaniline, propionic acid, propionamide, 3,3′,4,4′-tetrachloroazobenzene, and a humic acid were identified. The tetrachloroazobenzene also resulted from the photolysis of a dilute aqueous solution of 3,4-dichloroaniline. The principal pathways of propanil photodecomposition were: replacement of chlorine substituents by hydroxyl groups; formation of propionamide; replacement of chlorine substituents by hydrogen; and hydrolysis of the amide. Propanil and its benzenoid photolysis products were not appreciably volatile, and only propanil was phytotoxic. (Author abstract reprinted by permission of the American Chemical Society)

73-0041. Archer, T. E.; Nazer, I. K.; Crosby, D. G. (Dept. of Environ. Toxicol., Univ. of California, Davis, CA 95616). **Photodecomposition of endosulfan and related products in thin films by ultraviolet light irradiation.** *J. Agr. Food Chem. 20(5): 954-956; 1972.* (13 references)

Ultraviolet irradiation of endosulfan (6,7,8,9,10,10-hexachloro-1-5,5a,6,-9,9a-hexahydro-6,9-methano-2,4,3-benzodioxathiepin 3-oxide) isomers I and II in a thin film produced endosulfandiol as a major product. Endosulfan α-hydroxy ether, lactone, ether, and an unknown No. 1 were additional photodecomposition products but in lesser amounts than the diol. Irradiation of endosulfandiol produced α-hydroxy ether, unknowns No. 2 and 3. Irradiation of endosulfan ether gave the α-hydroxy ether and the lactone. Irradiation of endosulfan α-hydroxy ether gave the ether and unknowns No. 2 and 3. Irradiation of endosulfan lactone resulted in less than 1% each of the diol and the ether, but no α-hydroxy ether was produced. The endosulfan sulfate was not a product from any of the irradiated compounds, and no degradation products were detected when it was irradiated with ultraviolet light. Derivatization of the diol and the α-hydroxy ether by silylation and acetylation was necessary for the quantitation and identification of these two compounds within the photolysis mixtures. (Author abstract reprinted by permission of the American Chemical Society)

73-0042. Mazzocchi, P. H.; Rao, M. P. (Dept. of Chem., Univ. of Maryland, College Park, MD 20742). **Photolysis**

of 3-(*p*-chlorophenyl)-1,1-dimethylurea (monuron) and 3-phenyl-1,1-dimethylurea (fenuron). *J. Agr. Food Chem. 20(5): 957-959; 1972.* (13 references)

The herbicide 3-(*p*-chlorophenyl)-1,1-dimethylurea (monuron) was photolyzed under anaerobic conditions in methanol and was found to react cleanly to form the dechlorinated herbicide 3-phenyl-1,1-dimethylurea (fenuron). Methyl *p*-chlorophenyl-carbamate was obtained as a minor product. Photolysis of 3-phenyl-1,1-dimethylurea (fenuron) afforded aniline, *o*-amino-*N,N*-dimethylbenzamide. All products were isolated and identified by comparison with authentic materials. (Author abstract reprinted by permission of the American Chemical Society)

73-0043. Bjerke, E. L.; Herman, J. L.; Miller, P. W.; Wetters, J. H. (Residue Res. Ag-Organics Department, Dow Chemical U.S.A., Midland, MI 48640). **Residue study of phenoxy herbicides in milk and cream.** *J. Agr. Food Chem. 20(5): 963-967; 1972.* (8 references)

Cows were fed a complete ration containing 2,4-dichlorophenoxyacetic acid, 2,4,5-trichlorophenoxyacetic acid, 2-(2,4,5-trichlorophenoxy)-propionic acid, or 2-methyl-4-chlorophenoxyacetic acid at six levels from 10 to 1000 ppm for two or three weeks at each level. Milk and cream samples were collected at predetermined intervals during the feeding of these chemicals and for seven days following withdrawal of the highest level. Residues of the acids and their phenol moieties were extracted with diethyl ether, separated by liquid chromatography on alumina, and determined as esters and phenols by electron capture or microcoulometric gas chromatography. The procedure was used to quantitate the chemicals down to 0.05 ppm with overall average recoveries of greater than 80%. The average residues found in milk at the highest feeding level were: 0.06 ppm, 2,4-dichlorophenoxyacetic acid; <0.05 ppm, 2,4-dichlorophenol; 0.42 ppm, 2,4,5-trichlorophenoxyacetic acid; 0.23 ppm, 2,4,5-trichlorophenol; 0.12 ppm, silvex; <0.05 ppm, 2,4,5-trichlorophenol; <0.05 ppm, 2-methyl-4-chlorophenoxyacetic acid; 0.06 ppm, 2-methyl-4-chlorophenol. Residues of all chemicals decreased rapidly upon removal of the chemicals from the feed. (Author abstract reprinted by permission of the American Chemical Society)

73-0044. Kazano, H.; Kearney, P. C.; Kaufman, D. D. (Plant Sci. Res. Div., Agr. Res. Service, U.S. Dept. of Agr., Beltsville, MD 20705). **Metabolism of methylcarbamate insecticides in soils.** *J. Agr. Food Chem. 20(5): 975-979; 1972.* (16 references)

The persistence and metabolism of ^{14}C-carbonyl-labeled carbaryl (1-naphthyl methylcarbamate) and 3,5-xylyl methylcarbamate were studied in five different soil types at two concentrations. Persistence was influenced by soil type, and $^{14}CO_2$ evolution varied from 2.2 to 37.4% of initial radioactivity during 32 days of incubation. Hydrolysis was the main pathway of degradation since very low concentrations of ^{14}C-carbonyl metabolites were detected. $^{14}CO_2$ evolution from ^{14}C-1,4,5,8-ring-labeled naphthol in soil was only 8.2% after 60 days. More than 70% of radioactivity was found to be linked to humic substances. Four metabolites, one of which was coumarin, were produced from ring-labeled naphthol by a soil pseudomonad. (Author abstract reprinted by permission of the American Chemical Society)

73-0045. Patrashku, F. I. (All-Union Sci. Res. Inst. for Biological Plant Protection Methods, Moscow, USSR). **Rezul'taty izucheniya letuchesti i skorosti gidroliza metilnitrofosa, metationa i sumitiona v razlichnykh sredakh. [Results of studies on the volatility and rate of hydrolysis of fenitrothion, Metathion, and Sumithion in different media.]** *Khim. Sel. Khoz. 10(2): 119-122; 1972.* (7 references) (Russian)

The rates of evaporation of fenitrothion, Metathion, and Sumithion in closed areas and in open air and the rate of hydrolysis of fenitrothion in different media were determined. The rates of evaporation of fenitrothion, Metathion, and Sumithion, determined through Petri shells, were low in closed places (18, 28, and 35 days for the evaporation of 50%), depending on the emulsifier. The rates of evaporation obtained in open-air tests were much higher, indicating that the evaporation is a function of climatic factors such as temperature and air exchange. The rates of hydrolysis of fenitrothion in acid and neutral media were smaller than in a basic medium where a proportion of 85% hydrolyzed over 49 days. These hydrolytic processes occur also in acid plant saps, but at a slow rate.

73-0046. Liska, D. (Dept. of Hyg., Post-graduate Inst. for Med. and Pharmacy, Bratislava, Czechoslovakia). **Zdravotnohygienicke a toxikologicke problemy rezidui pesticidov v niektorych zlozkach zivotneho prostredia. [Sanitary-hygienic and toxicological problems of pesticide residues in some spheres of the environment.]** *Lek. Obz. 20(1): 11-15; 1971.* (22 references) (Slovak)

Published findings on pesticide residues in air, water, food, and human fat were reviewed. Pesticide residues in the atmosphere can be considered non-toxic; only several nanograms of pesticides per m^3 air have been measured. In drinking water only threshold olfactory and taste concentrations of organophosphorus insecticides, far below toxic levels, have been reported. The toxicity threshold for fishes for various insecticides is: 0.02-0.1 mg/l. for DDT; 0.03-0.2 mg/l. for lindane; 0.01 mg/l. for toxaphene; 0.1-0.2 mg/l. for parathion; 0.2 mg/l. for fenitrothion; and 0.2 mg/l. for malathion. Pesticide residues in foods are hazardous. In Czechoslovakia the maximal permissible DDT level in foods is 1 mg/kg; absence of residues in milk fat is not required. Dieldrin levels in milk are closely related with levels in feeds; 0.1 ppm in beef results in 0.02 ppm in milk. In some foods up to 32 mg DDT/kg was found. DDT levels in human fat varied from 0.8 to 3.1 ppm. The largest daily human intake of DDT was 0.6 mg per person.

73-0047. Hammett, H. L.; Cain, J. D. (Mississippi Agr. and Forestry Exp. Station, MS). **Tests on snap bean plants for pesticide residues.** *Miss. Farm Res. 35(4): 4; 1972.*

In a study at Mississippi State University in 1970, the pesticide content of an Ora fine sandy loam soil and of snap bean (*Phaseolus vulgaris*) stems, leaves, and pods grown in this soil was measured in ppm by gas chromatography to determine the influence of plant part on pesticide accumulation. Trifluralin and carbaryl were the only pesticides applied to the crop; these were not detected in any of the plant samples. Measurable amounts of chlorinated hydrocarbons were detected in the soil and the crop plants, even though these had not been applied since 1958. Several decay products of DDT (DDE, *o,p,*-DDT, and *o,p,'*-DDT) as well as dacthal, endrin, dieldrin, and toxaphene were found in the crop plant. The leaf contained approximately three times as much pesticide as the stem on a fresh weight basis for most of the chemicals analyzed. All of the pesticides found in the stem and leaf were also present in the pod, except toxaphene. The greatest concentration of any one material in the pod was only 1 ppb; this value is substantially lower than that of the stem. Apparently, the snap bean plant is able to concentrate large amounts of pesticides in the foliage through absorption and translocation with relatively little of the material moving into the reproductive structures.

73-0048. Hayashi, M. (Dept. of Maternal and Child Health, Nat. Inst. of Pub. Health, Tokyo, Japan). **[Pollution of mothers' milk by organochlorine pesticides.]** *Nippon Koshu Eisei Zasshi (Jap. J. Pub. Health) 19(9): 437-441; 1972.* (34 references) (Japanese)

A special research group appointed by the Japan Ministry of Public Welfare analyzed samples of mothers' milk for organochlorine residues. In 454 milk samples collected in 24 prefectures during January-March, 1971, from mothers at 1-4 months after delivery, the residues were as follows: 0.1259 ppm total BHC; 0.0031 ppm α-BHC; 0.1200 ppm β-BHC; 0.0025 ppm γ-BHC; 0.0008 ppm δ-BHC; 0.0607 ppm total DDT; and 0.0037 ppm dieldrin. A second set of 398 samples, collected from mothers in all 36 Japanese prefectures in November 1971 to March 1972, yielded the following residue levels: 0.1009 ppm β-BHC; 0.0626 ppm total DDT; 0.0034 ppm dieldrin; and 0.0011 ppm heptachlor epoxide. There was an apparent decline in the β-BHC and dieldrin levels. The anticipated distribution patterns were found: milk from urban mothers showed greater pesticide contamination than that from rural mothers due to the greater consumption of meat and dairy products in the cities; residue levels were higher in the western prefectures where pesticide use is more extensive than in eastern Japan; and the β-BHC levels are much higher than in western countries due to the extensive use of technical BHC containing the slowly metabolized β-isomer. The presence of BHC in newborns' meconium indicated placental transfer.

73-0049. Tsukano, Y.; Endo, S.; Kobayashi, A. (Nat. Inst. of Agr. Sci., Min. of Agr. and Forestry, Tokyo, Japan). **[Residues of BHC in soil and their uptake and translocation in rice plants.]** *Noyaku Seisan Gijutsu (Pestic. Tech.) 28: 28-29; 1972.* (Japanese)

BHC residues in various parts of rice plants were determined following a single application of a granular BHC formulation. Residues in paddy soil not treated in the current year were: 0.014 ppm α-BHC; 0.032 ppm β-BHC; 0.005 ppm γ-BHC; and 0.004 ppm δ-BHC. The treated soil contained 0.33 ppm α-BHC, 0.57 ppm β-BHC, 0.046 ppm γ-BHC, and 0.14 ppm δ-BHC at the time of harvest. Unpolished rice harvested from plants grown in the treated soil contained 0.025, 0.010, 0.025, and 0.010 ppm of the respective isomers with residues in unpolished rice from untreated plots averaging 20-50% less than those from the treated plots. Residues in the rice straw and plant roots were approximately 10 times greater than in the rice grain. Degradation of BHC in soil apparently progressed more rapidly than in the rice grain. Differences in uptake, translocation, and degradation of the four BHC isomers by the rice plants were apparent.

73-0050. Brewerton, H. V.; Gibbs, M. M.; Davison, R. M. (Chem. Div., DSIR, Private Bag, Petone, New Zealand). **Dimas ('Alar') residues in apples and chinese gooseberries (*Actinidia chinenis* Planch).** *N. Z. J. Agr. Res. 15(2): 388-394; 1972.* (6 references)

Treatment of three varieties of apple trees with a single spray of 200 ppm dimas (aminozide) 47-75 days before harvest resulted in final harvest residues of $\leqslant 15$ ppm. A concentration maximum was observed two wk before harvest, but the absolute amount of dimas per fruit increased. Residues in chinese gooseberries which had the same spray treatment also increased for a time, but there was a marked decline in amount of dimas present during the two mo before harvest in two of the varieties. Harvest residues were 40, 20, and 10 ppm for 'Allison,' 'Abbott,' and 'Monty,' varieties. An even distribution of the dimas throughout the skin and flesh of the fruit was attained at an early stage. Residues obtained were within the U.S. tolerance levels for apples and other fruits.

73-0051. Yao, B. C.; Geisman, J. R. (Ohio Agr. Res. and Develop. Cent., Wooster, OH). **Removal of malathion from spinach by commercial and home preparation procedures.** *Ohio Agr. Res. and Develop. Cent. Res. Circular No. 188, pp. 3-23; 1972.* (22 references)

Malathion residues in excess of those expected on normal spinach crops were significantly reduced or removed by the unit operations involved in preparation and processing. The crop was sprayed with malathion wettable powder at 1 lb/acre close to harvest time. Under field conditions a fast rate of decomposition occurred on the first day while the rate slowed considerably afterwards. No residue was found after 11 days.

Washing procedures aided removal of malathion residues in raw crops harvested one and three days after spraying. Warm water detergent washing reduced the residue 97-99%. Trace amounts of residues remaining after washing were reduced or completely removed by blanching (processing) and cooking (home preparation); freezing did not reduce residues. Analysis of the data indicated that except in the first washing the initial concentration of residues in the spinach crop does not significantly affect the percentage of residues removed.

73-0052. Benson, W. W.; Gabica, J. (Idaho Dept. of Health, Boise, ID 83707). **Total mercury in hair from 1,000 Idaho residents–1971.** *Pestic. Monit. J. 6(2): 80-83; 1972.* (14 references)

In a study of mercury in hair from 1,000 people throughout Idaho, mercury was found in all samples. The mean concentration was 4.18 ppm, and mean levels for samples from males and females were 2.45 and 5.90 ppm. Mercury levels ranged from a low of 0.12 ppm in a male to a high of 139.0 ppm in a female. No common source of mercury exposure was found, and there is no explanation at this time for the higher mercury levels in hair samples from women. (Author abstract by permission)

73-0053. Wyllie, J.; Gabica, J.; Benson, W. W. (Idaho Dept. of Health, Boise, ID 83707). **Comparative organochlorine pesticide residues in serum and biopsied lipoid tissue: A survey of 200 persons in southern Idaho–1970.** *Pestic. Monit. J. 6(2): 84-88; 1972.* (22 references)

Paired samples of serum and adipose tissue from patients undergoing abdominal surgery were studied to determine residue levels of organochlorine pesticides in the two tissues. Although the residue levels were found to vary with the type of pesticide and with sex and age of the donors, levels in Idaho residents did not differ greatly from persons elsewhere in terms of body burden. Attempts at establishing the degree of compartmental equilibria for *p,p'*-DDE and *p,p'*-DDT between the two tissues revealed that the distribution of these two residues was not directly proportional. (Author abstract by permission)

73-0054. Steevens, D. R.; Walsh, L. M.; Keeney, D. R. (Dept. of Soil Sci., Univ. of Wisconsin, Madison, WI 53706). **Arsenic residues in soil and potatoes from Wisconsin potato fields–1970.** *Pestic. Monit. J. 6(2): 89-90; 1972.* (7 references)

Potato fields in Wisconsin known to have been treated with sodium arsenite ($NaAsO_2$) were surveyed in 1970 to determine residue levels of arsenic (As) in potato tuber peelings and flesh and in the soil. Total soil As residues ranged from 2.2 to 25.7 ppm and were generally related to the amounts applied. Potato tuber peelings contained 0.2 to 2.6 ppm As, but regardless of the amount of $NaAsO_2$ applied, the tuber flesh did not exceed 0.6 ppm As. It was concluded that As had not accumulated to potentially harmful levels in these Wisconsin potato fields. (Author abstract by permission)

73-0055. Adley, F. F.; Brown, D. W. (Hanford Environ. Health Foundation, Richland, WA 99352). **Mercury concentrations in game birds, State of Washington–1970 and 1971.** *Pestic. Monit. J. 6(2): 91-93; 1972.* (4 references)

In a survey to determine the presence of mercury in the liver of game birds, 246 specimens contributed by local hunters during October 1970 to January 1971, and 4 obtained in May 1971 were analyzed. The species included pheasant, quail, chukar partridge, duck, geese, and grouse. Muscle samples were submitted with some of the liver specimens and, in those instances, these tissues also were analyzed. The highest average mercury concentrations were in livers from mergansers (11.67 ppm) and teal (0.29 ppm), species with diets including aquatic organisms and thus differing from the other samples. The average mercury levels in liver from the other species were: 0.08 ppm in pheasant; 0.03 ppm, quail; 0.06 ppm, chukar partridge; 0.12 ppm, ducks (other than teal and mergansers); 0.16 ppm, geese; and 0.02 ppm, grouse. Of the species with both muscle and liver tissue analyzed, quail had the highest muscle to liver ratios of mercury and mergansers the lowest. In view of the practice of fall seeding with mercury-dressed seeds, the importance of the period of exposure to the treated seeds was investigated. No apparent correlation was evident between liver concentrations and the time of year the birds were killed. (Author abstract by permission)

73-0056. Durant, C. J.; Reimold, R. J. (Marine Inst., Univ. of Georgia, Sapelo Island, GA 31327). **Effects of estuarine dredging of toxaphene-contaminated sediments in Terry Creek, Brunswick, Ga.–1971.** *Pestic. Monit. J. 6(2): 94-96; 1972.* (2 references)

The possible reintroduction of toxaphene into estuarine biota from dredging and displacement of contaminated sediment in Terry Creek, Brunswick, Ga., was studied. In the estuary the sediments near a toxaphene plant outfall were contaminated with toxaphene approaching 2,000 ppm, and oysters collected two miles from the outfall contained residue levels near 6 ppm. Analyses of oysters and sediment before and after dredging operations revealed no significant increase of toxaphene residues resulting from the dredging and resultant spoil runoff. (Author abstract by permission)

73-0057. Fay, R. R.; Newland, L. W. (Dept. of Oceanography, Texas A&M Univ., College Station, TX 77843). **Organochlorine insecticide residues in water, sediment,**

and organisms, Aransas Bay, Texas–September 1969–June 1970. *Pestic. Monit. J. 6(2): 97-102; 1972.* (10 references)

An investigation was conducted to determine the presence and distribution of organochlorine insecticide residues in Aransas Bay and its contributing bays at Rockport, Tex. A total of 80 water samples, 29 sediment samples, and 11 samples of eight different types of organisms were collected and analyzed from September 1969 through June 1970. Organochlorine insecticide residues were detected in only three water samples and three sediment samples and, although residues were detected in 8 of the 11 organism samples, these were all at low levels (< 67 ppb). The predominant residues found in the organisms were dieldrin, *p,p'*-DDD (TDE), and *p,p'*-DDE. The occurrence or concentration of residues could not be related to salinity or pH of the water or percent organic content of the sediments. (Author abstract by permission)

73-0058. Knight, Jr., L. A.; Herring, J. (Dept. of Biol., Univ. of Mississippi, University, MS 38677). **Total mercury in largemouth bass (*Micropterus salmoides*) in Ross Barnett Reservoir, Mississippi–1970 and 1971.** *Pestic. Monit. J. 6(2): 103-106; 1972.* (13 references)

Total mercury in 73 largemouth bass , *Micropterus salmoides*, from Ross Barnett Reservoir, Mississippi, was measured by atomic absorption spectrophotometry. The fish analyzed were collected between November 1970 and October 1971 at intervals representing winter, spring, summer, and fall; specimens ranged in weight from 0.10 to 3.15 kg. Fish contained from < 0.05 to 0.74 ppm total mercury; levels generally increased with weight of the fish. (Author abstract by permission)

73-0059. Robel, R. J.; Stalling, C. D.; Westfahl, M. E.; Kadoum, A. M. (Div. of Biol., Kansas Agr. Exp. Sta., Kansas State Univ., Manhattan, KS 66502). **Effects of insecticides on populations of rodents in Kansas–1965-69.** *Pestic. Monit. J. 6(2): 115-121; 1972.* (22 references)

The general objective of this study was to determine the effect of recommended applications of commonly used insecticides on population dynamics of unconfined rodents in two sites in Ellis County, Kansas. Six insecticides (diazinon, endrin, heptachlor, parathion, methyl parathion, and aldrin) were applied to one field while a second field served as a control. Insecticide applications began in summer 1965 and continued through summer 1968. Live trapping of rodents was conducted on the treated field and the control field from 1965 through 1969. Specimens were collected each month for residue analysis. During 19 separate 10-day trapping periods, 4,661 rodents were captured of which 162 were analyzed for the six insecticides. Insecticidal residues were detected in 36 of these specimens. Dieldrin residues were detected in 33 specimens and heptachlor epoxide in eight specimens (five of these specimens had residues of both dieldrin and heptachlor epoxide). These residue levels were low with no dieldrin levels in specimens exceeding 0.50 ppm, and no heptachlor epoxide levels exceeding 0.02 ppm. No residues of the other four insecticides were detected in any of the specimens. Species composition of the trapped rodents was similar for the two study areas as were the population levels with *Peromyscus maniculatus* comprising about 74% of the rodent population on the two areas. Population fluctuation trends for the two areas were also similar. Average minimal longevity for *P. maniculatus* was 45.7 days on the treated area and 50.9 days on the control area. Monthly survival between June and September was about 45% on both areas. Recaptures of *P. maniculatus* the year following their initial marking were slightly greater on the untreated area than on the treated area. The slight differences in dynamics of the rodent populations on the two areas could easily have been due to chance, minor differences between the two study areas, or differential emigration of specimens from the areas as well as direct or indirect effects of insecticidal applications. (Author abstract by permission)

73-0060. Sumner, A. K.; Saha, J. G.; Lee, Y. W. (Canada Agr. Res. Sta., Univ. Campus, Saskatoon, Saskatchewan, Canada). **Mercury residues in fish from Saskatchewan waters with and without known sources of pollution–1970.** *Pestic. Monit. J. 6(2): 122-125; 1972.* (17 references)

In 1970, mercury concentrations were determined in muscle tissue of 125 fish from ten Saskatchewan waters, six of which were part of the Saskatchewan River system receiving industrial and/or municipal wastes containing mercury, and four of which had no known sources of mercury pollution. Concentrations in fish from the Saskatchewan River system ranged from 0.18 to 8.88 ppm depending on the degree of pollution of the fish collection site. Levels were higher (0.18 to 8.88 ppm) in fish caught downstream from a chlor-alkali plant in Saskatoon than those (0.25 to 1.2 ppm) in fish from sites upstream from this plant whose sources of mercury were municipal or industrial wastes other than the chlor-alkali industry. Levels in fish from the four lakes without any known source of mercury pollution ranged from 0.11 to 1.13 ppm. These results indicate that mercury levels in fish from apparently unpolluted waters may exceed the Canadian actionable level of 0.5 ppm for mercury; such residues may be of natural origin. (Author abstract by permission)

73-0061. Wiersma, G. B.; Tai, H.; Sand, P. F. (Pestic. Regulation Div., Environ. Protect. Agency, Washington, DC 20460). **Pesticide residues in soil from eight cities–1969.** *Pestic. Monit. J. 6(2): 126-129; 1972.* (3 references)

Soil samples from eight cities were analyzed for

pesticide residues. Besides DDT and its metabolites (DDTR), other pesticides detected were dieldrin, chlordane, heptachlor, heptachlor epoxide, toxaphene, and endrin. No organophosphate residues were detected. Levels of DDTR varied significantly among the eight cities, with the highest average residue level in Miami, Fla., (5.98 ppm) and the lowest in Houston, Tex., (0.35 ppm). When residue levels in lawn or garden areas were compared to those in unkept areas within the cities, DDTR residues were significantly greater for lawn areas. (Author abstract by permission)

73-0062. Luquet, F.; Goursaud, J.; Leroy, M.; Roux, M.; Marciniak, C.; Delannoy, F.; Degros, A. (Author address not given). **Les residus de pesticides organochlores dans le lait et les produits laitiers. Bilan 1969-1970-1971. 2e partie: Taux de pollution du lait et des produits laitiers francais. [Organochlorine pesticide residues in milk and dairy products. Balance of the 1969-1970-1971 period. Part 2: Rate of pollution of milk and dairy products in France.]** *Rev. Lait. Fr. 298: 403-412; 1972.* (French)

Organochlorine pesticide residue levels in French dairy products and milk from 1968-1971 are reviewed. Butter samples investigated in 1968 contained 0.71 ppm of lindane and BHC, 0.025 ppm of DDT and DDE, 0.03 ppm dieldrin, and 0.025 ppm heptachlor epoxide. Samples in 1970 contained high concentrations of BHC and were contaminated only lightly with aldrin, dieldrin, and heptachlor epoxide. Territorial and seasonal variations in the pollution level were apparent with aldrin, dieldrin, and heptachlor epoxide with the maximum in winter and the minimum in summer. The residues in cheese samples ranged from zero to 10 ppm. The residue levels in milk samples varied, but showed a downward trend during the investigated period. Milk samples collected during 1969-1971 contained 0.097-0.89 ppm BHC, 0.02-0.1 ppm heptachlor epoxide, 0.03-0.095 ppm dieldrin plus aldrin, and 0.05-0.11 ppm DDT. The highest residue level of 0.85 ppm (representing 11% of the samples), was found in Sept. 1969 and followed by another peak of 0.89 ppm (6.5% of the yearly sample contingent) in March 1970. The average for the period of February-April 1971 was slightly above 0.4 ppm; the number of polluted samples increased concomitantly. Heptachlor epoxide or dieldrin was detected in 95% of all samples in 1970 and 1971.

73-0063. Luczak, J.; Zycinski, D. (Zaklad Higieny Komunalnej, Panstwowy Zaklad Higieny, Warsaw, Poland.) **Charakterystyka fizyczno-chemiczno wody w zbiornikach wodnych zanieczyszczonych eksperymentalnie Tritoksem. [Physico-chemical characteristics of water in water pools polluted experimentally with Tritox.]** *Rocz. Panstw. Zakl. Hig. 22(3): 257-264; 1971.* (10 references) (Polish)

Water from three shallow pools was tested at frequent intervals over a two year period after application of liquid Tritox-30 (DDT+DMDT+lindane) (144 mg/kg) to the soil surface 0.4-7.0 m from the pools. The following residues were found: DDT (0.015 mg/l.) and DMDT (methoxychlor) (0.005 mg/l.) up to 119 days; BHC (0.012-0.130 mg/l.) up to 18 days. BHC and DMDT first appeared in water after two days, DDT after 18; DDT, however, reappeared (0.008 mg/l.) after 399 and 449 days preceded by heavy rainfalls. Lindane persisted in the soil for one year, DDT and DMDT for two years. Tritox-30 added directly to the water of two different pools in amounts of 25 mg/l. and 75 mg/l. changed the color, taste, and odor, increased the ammonia, oxidizability, and BOD, and decreased oxygen saturation. Residues of DDT, DMDT, and BHC persisted for approximately 35-62 days.

73-0064. Munson, T. O.; Burnett, R. (Ocean Res. Lab., Westinghouse Electric Corp., Annapolis, MD 21404 and Hopkins Marine Station, Pacific Grove, CA 93950). **PCB's in sand crabs.** *Science 177(4050): 652; 1972.* (1 reference)

Letters-to-the-Editor following a report on DDT residues in sand crabs from the coast of California clarified the issue of polychlorinated biphenyl (PCB) concentration in these crabs. Values were not given in the report, but the author found a total DDT to Aroclor 1254 ratio of 0.9 for one sampling station and 1.4 for the other. Work done 4 mo previously by another investigator indicated total DDT to polychlorinated biphenyl ratios of 0.35 and 1.0 at stations corresponding to those above but somewhat closer to large sewer outfalls.

See also **73-0005** **73-0016** **73-0021** **73-0022** **73-0068** **73-0075** **73-0078** **73-0079** **73-0080** **73-0082** **73-0083** **73-0098** **73-0154** **73-0175** **73-0221** **73-0233** **73-0238** **73-0245** **73-0253**

73-0065. Matthew, H.; Fisher, H. K. (The Royal Infirmary, Edinburgh, Scotland and Harborview Med. Cent., Univ. of Washington, Seattle, WA). **Paraquat and the lung.** *Ann. Intern. Med. 76(5): 835; 1972.* (5 references)

In a Letter-to-the-Editor evidence of pulmonary damage in a patient surviving paraquat poisoning is challenged. The reply lists several arguments in support of pulmonary damage in the patient in question. A trend of improvement was observed in measurements of lung function, airflow rates, airway resistance and the alveolar-arterial gradient for oxygen. Pleural effusion and segmental atelectasis were found. Although changes were not as pronounced as in another case of paraquat poisoning, they were similar to those reported; blood levels were slightly higher than those reported to cause changes in lung.

73-0066. Starr, Jr., H. G.; Clifford, N. J. (Colorado Community Study on Pestic., Colorado Dept. of Health, Greeley, CO 80631). **Acute lindane intoxication. A case study.** *Arch. Environ. Health 25(5): 374-375; 1972.* (3 references)

A 2½-year-old girl ingested one or more lindane pellets. Irritability followed by grand mal seizures occurred. On supportive therapy she recovered within 24 hours. Serum levels were relatively high initially but dropped rapidly. Considerable amounts of pesticide were present in the initial stool sample, suggesting that induced emesis and catharsis would be an effective mode of therapy in such patients. (Author abstract by permission)

73-0067. Mal'tsev, P. V. (Dept. of Clinical Pediatrics, Omsk M. I. Kalinin Med. Inst., Omsk, USSR). **Granozanovaya intoksikatsiya u detey. [Granosan poisoning in children.]** *Feldsher Akush. 37: 14-16; 1972.* (Russian)

General symptoms of Granosan poisoning in children are outlined. Such poisonings in children are mostly caused by the consumption of Granosan-contaminated sunflower seeds. The latency time usually does not exceed 2-3 weeks in children. The first symptoms of Granosan poisoning are dry mouth, excessive thirst, asthenia, fatigability, and loss of appetite, followed by nausea, vomiting, liquid feces, abdominal pains, and temperatures of 37.5-38°C. The neurological syndrome develops: ataxia; tremor; dysarthria; depression alternating with psychomotor excitation; impaired vision; and disturbed sleep. Damage to the nervous system may be irreversible even in moderate poisoning. Damage to the kidney, the liver, the hemopoietic and cardiovascular systems, and the gastrointestinal tract may occur. Polyuria (urine protein, erythrocyte, and mercury contents of 0.03-2.5 mg/l.) appears during the first days of the poisoning. Hepatomegalia, persistent hypochromic anemia, leukocytosis (leukocyte counts of 12,000-15,000), granulosity of the neutrophils, erythrocyte sedimentation rates of 20-40 mm/h, uneven cardiac rhythm, reduced arterial pressure, and extrasystole are found in serious cases. Pneumonia may develop. Degenerative, inflammatory, and necrotic alterations as well as hemorrhages in the CNS, kidney, liver, heart, and intestines may be observed on autopsy. Granosan is most dangerous to the embryo during the third and fourth months of pregnancy. Liberal administration of liquids, glucose, sodium chloride, plasma, unithiol, and sodium thiosulfate treatment are applied in therapy.

73-0068. D'yachuk, I. A. (Regional Sanitary and Epidemiol Sta., Med. Inst., Kishinev, USSR). **Gigiyenicheskaya otsenka usloviya truda v kontrol'no-semennykh laboratoriyakh. [Hygienic assessment of the working conditions in seed treatment facilities.]** *Gig. Tr. Prof. Zabol. 16(3): 45-47; 1972.* (7 references) (Russian)

The working conditions in seed treatment plants and the health status of their employees were investigated. Relative humidity of 70-90% and temperatures up to 26°C were measured; seed dust and pesticide (thiram and ethylmercury chloride (Granosan)) dust and vapors were detected in the air. The thiram concentrations averaged 0.2-5.0 mg/m^3 with an absolute maximum of 12.5 mg/m^3. The thiram concentrations were often above the maximum allowable level while the ethylmercury chloride concentrations were 0.0015-0.005 mg/m^3. Buildup samples taken from the skin contained traces of ethylmercury chloride and 0.0014-0.008 mg of thiram per cm^2. The common complaints were: asthenia; headache; vertigo; irritability; disturbed sleep; rheumatic pains; pains in the legs, arms, right hypochondrium, and gastric and cardiac regions; nausea; poor appetite; pressure in the thyroid gland region; rash and pruritus; sore throat; and cough. Intensified tendon reflex, finger tremor, red dermatographia, hepatomegalia and frequent liver complaints, and slight enlargement of and increased radioactive iodine absorption by the thyroid gland were determined. Increased incidence of respiratory diseases such as rhinitis, pharyngitis, common cold, bronchitis, and angina was noticed.

73-0069. Rakhmatullayev, N. N. (Dept. of Environ. Hyg., Sechenov First Moscow Med. Inst., Moscow, USSR). **Hygienic characteristics of the nematocide Nemagon (dibromochloropropane) in relation to water pollution control.** *Hyg. Sanit. 36(3): 344-348; 1971.* (5 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 36(3): 19-23; 1971, see Abstract no. 72-0751.

73-0070. Martson', L. V.; Pilinskaya, M. A. (All-Union Res. Inst. Hyg. and Toxicol. of Pestic., Polymers, and Plastics, Kiev, USSR). **On hygienic characteristics of working conditions in production of ziram.** *Hyg. Sanit. 36(3): 458-460; 1971.* (4 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 36(3): 107-108; 1971, see Abstract no. 72-0752.

73-0071. Malone, J. D. G.; Carmody, M.; Keogh, B.; O'Dwyer, W. F. (Renal Unit, Jervis Street Hospital, Dublin, Ireland). **Paraquat poisoning—a review of nineteen cases.** *J. Ir. Med. Ass. 64(405): 59-68; 1971.* (34 references)

Nineteen cases of paraquat poisoning are outlined and a tentative approach to therapy given. Ten of the cases described (nine suicides) ingested massive doses of the poison and died. Nine cases (eight accidental) ingested small amounts. In the latter group four patients survived and no evidence of late pulmonary involvement was observed. Late pulmonary changes developed in five patients, three of whom survived. This is the first report of survival of patients with similar positive evidence of pulmonary infiltration and fibrosis. One survivor received induced emesis immediately after ingestion, but received no specific treatment. The other two were treated with cyclophosphamide and prednisone or hydrocortisone. Peritoneal dialysis was initiated in one case to overcome acute-tempory renal failure. Dialysis, mandatory in severe acute renal failure, is effective as a method of removing paraquat only within 36 hr of ingestion. In those cases in which recovery from hepatic and renal damage is expected, steroid and cyclophosphamide therapy, begun as soon as diagnosis is established, is useful in modifying the progression of the pulmonary lesion.

73-0072. Fennelly, J. J.; Fitzgerald, M. X.; Fitzgerald, O. (St. Vincent's Hospital, Dept. of Med. and Therapeutics, Univ. College, Dublin, Ireland). **Recovery from severe paraquat poisoning following forced diuresis and immunosuppressive therapy.** *J. Ir. Med. Ass. 64(405): 69-71; 1971.* (10 references)

An 18 yr old boy was treated successfully after ingestion of paraquat. Gastric lavage, forced diuresis, and immunosuppressive therapy were used. Renal and hepatic damage developed but the pulmonary proliferative alveolar lesion was modified dramatically; only a change in gas transfer was observed. The forced diuresis was probably responsible for the overall success of treatment. It is difficult to determine whether the minimal change in respiratory function resulted from the use of diuresis or from the initiation of immunosuppressive therapy prior to the expected onset of respiratory symptoms.

73-0073. Best, L. B. (Dept. of Zool., Univ. of Illinois, Urbana, IL 61801). **First-year effects of sagebrush control on two sparrows.** *J. Wildl. Manage. 36(2): 534-544; 1972.* (15 references)

This study, conducted in central Montana during the summers of 1968 and 1969, was designed to examine effects of sagebrush (*Artemisia tridentata*) control on two nongame birds: Brewer's sparrows (*Spizella breweri*) and vesper sparrows (*Pooecetes gramineus*). Plots were established in sagebrush-grassland habitat and subjected to five treatments: total kill spray, strip spray, partial kill spray, defer control, and open control. Plots were sprayed with 2,4-D in late June 1968. The total kill spray eradicated sagebrush, increased grass coverage, and reduced forb abundance. Similar but less extreme changes followed partial kill. Only on the total kill spray plot did breeding pairs of Brewer's sparrows notably decline (54 percent) after spraying. No significant change occurred in pairs of vesper sparrows on the sprayed plots. Although both species utilized sagebrush for nest cover, vesper sparrows nested on the ground, whereas Brewer's sparrows nested in shrubs. The Brewer's sparrow selected larger sagebrush for nest sites when the shrub was dead, but spraying apparently did not influence shrub size selected by the vesper sparrow. Often, the Brewer's sparrow compensated for lack of foliage by selecting more densely branched sagebrush. Additional concealment by grass was greater at nest sites of both species when the shrub was dead. Plant foods (primarily grass seeds) represented a greater portion of the diets of both sparrows on the sprayed area than on the unsprayed area. Animal foods showed an opposite trend. As a result of spraying, major plant and animal foods that were consumed differed in amount rather than in variety. Dependence upon sagebrush for nest cover will be a major factor determining the ultimate effects of sagebrush control on Brewer's and vesper sparrows. (Author abstract by permission)

73-0074. Voiculescu, V.; Gheorghiu, M.; Cioran, C.; Dumitrescu, C.; Plaiasu, D. (Spitalul "G. Marinescu," Clinica de Neurologie II, Bucharest, Rumania) **Polinevrite prin intoxicatie cu insecticide din grupul organofosforic (paration si dipterex). [Polyneuritis due to organophosphate insecticide (parathion and dipterex) poisoning.]** *Neurol., Psihiat., Neurochir. 16(6): 535-539; 1971.* (2 references) (Rumanian)

Two cases of organophosphate insecticide poisoning are presented. One case was a suicide attempt with parathion and the other an accident which occurred while handling dipterex (trichlorfon). In addition to the usual organophosphate poisoning symptoms, the patients developed polyneuritis involving the distal limb muscles after the acute period of encephalitis and coma. Disappearance of the Achilles tendon reflex was associated with sharpened osteotendon reflexes indicating a coinvolvement of peripheral and central motor neurons in the overall condition. Both patients had reduced neuron conductivity rates and sensitivity disorders. The patient who had ingested parathion showed no improvement in her motor condition four months after the incident. Development of polyneuritic sequelae (considered to be unusual in parathion or dipterex poisoning)

was attributed to the action of alcohol which both patients had ingested the day of the incident.

73-0075. Watanobe, S. (Watanobe Hospital of Intern. Med., Aomori Prefecture, Japan). **[Detection of organophosphate pesticides in sera from diagnosed cases of acute or chronic organophosphate poisoning.]** *Nippon Naika Gakkai Zasshi (J. Jap. Soc. Intern. Med.) 61(8): 953-954; 1972.* (Japanese)

Organophosphate pesticides were determined in sera to confirm procedures for diagnosing pesticide intoxication. Ten healthy people, 30 patients with acute poisoning, and 30 patients suspected of having chronic intoxication were used. The latter were selected from people with 5-20 yr organophosphate pesticide application experience and having symptoms of heaviness of head, headache, vomiting, and paralysis of extremities. Acute patients were those who were healthy before pesticide applications. Blood sampling was taken from April to May 1971, prior to normal pesticide application. The pesticide determinations were carried out by gas chromatography with PID without cleanup following the method in *Hygienic Chem.* (Jap.) vol. 16, 1970. In the sera of 20 of the suspected chronic patients the following organophosphate pesticides were determined: 0.980-0.0001 ppm parathion; 1.075-0.0072 ppm malathion; 0.075-0.001 ppm fenitrothion; 0.006-0.001 ppm salithion. Symptoms were more marked in acute cases of intoxication when the organophosphate pesticide residues were larger. The values detected were: 0.0067-0.002 ppm parathion; 5.157-0.002 ppm fenitrothion; 0.57-0.002 ppm malathion; and 0.006-0.001 ppm salithion. The intensity of the symptoms depended also on the length of application and the health of the applicator. The severest symptoms were caused by parathion and malathion. Liver function impairment was noticed in almost all of the chronic patients,and several EKG anomalies were found.

73-0076. Nagata, H. (Hokushin General Hospital, Nagano Prefecture, Japan). **[On the recent health conditions of the operators of pesticide speed sprayers.]** *Nippon Noson Igakkai Zasshi (J. Jap. Ass. Rural Med.) 21(2): 232-233; 1972.* (Japanese)

Medical examinations were carried out on operators of pesticide speed sprayers (SSO) to determine their health status. Fifty-one people between the ages of 18 and 50 were examined in 1970, and 70 in the same age range from 1971-1972. Anomalies were found in hemoglobin, erythrocyte and leucocyte counts, serum ChE activity, SGPT, alkaline phosphatase activity, and protein, sugar, and urobilinogen in urine. A large number of SSO showed a lower leukocyte count than controls and abnormal alkaline phosphatase values. The major subjective symptoms during spraying were dermal, ocular, nasal, and laryngopharyngeal injuries mainly due to organophosphate pesticides such as vamidothion. Many pesticides, including poisonous organophosphates and DDT related organochlorines, were used, but no cases of chronic intoxication were observed. The SSO paid little attention to the toxicity of the pesticides as shown by negligence in donning the protective masks, goggles, and clothing. The importance of sensitive examining systems, the education of SSO on the toxicity of pesticides, and systematic co-operative pest control carried out by educated and well trained experts is emphasized.

73-0077. Uchida, A.; Ishige, T.; Saito, M.; Oikawa, K. (Institute of Rural Med., Chiba Univ., Chiba, Japan). **[Results of the status of acute pesticide intoxications.]** *Nippon Noson Igakkai Zasshi (J. Jap. Ass. Rural Med.) 21(2): 234-235; 1972.* (Japan)

Methods of pesticide application and the occurrence of acute pesticide intoxication were investigated from April 1971 to March 1972 with 28 men and 27 women from 29 farming families having their own fields of about 1.36 ha in Chiba prefecture. Methods of investigation included self-kept calendars and personal interviews once a month. The pesticides were applied 19.3 times by men and 14.3 by women, mostly around June. In the busiest month, 100% of the men and 93% of the women in the area applied pesticides on the average of 6.5 and 5.6 times, respectively. Many pesticides were used, including the legally banned BHC and DDT, on a variety of crops, mostly vegetables. There were three acute cases of intoxication in May (2 men, 1 woman), 10 in June (6 men, 4 women), and two in July (2 women). The major symptoms were headache and nausea not requiring medication. Intoxication occurred only in aged persons and occurrence by sex was 25% for men and 22% for women. Blood and liver function were examined. Anemia was found only among women—where liver function anomalies were lower. The number of pesticide applications and the occurrence of acute cases of intoxication were less than those found the previous year in citrus growing families in the western part of Shizuoka prefecture.

73-0078. Rikimaru, T.; Goto, T.; Ezaki, H.; Takamatsu, M. (Sch. of Environ. Hyg., Fac. of Med., Kurume Univ., Kurume, Japan). **[Status of pesticide application and injuries in cultivators of illuminated chrysanthemum.]** *Nippon Noson Igakkai Zasshi (J. Jap. Ass. Rural Med.) 21(2): 236-237; 1972.* (Japanese)

The health of 50 families of workers in illuminated chrysanthemum growing sheds in Fukuoka prefecture was examined in May and October, 1971, to determine any relationship between contact dermatitis and pesticide applications. Examinations were made of labor conditions, diet, subjective symptoms, biometry, blood, liver function, urine, blood pressure, ECG, and general health. Patch tests with pesticides were also done (48 hr). Pesticides used in the chrysanthemum growing

included dichlorvos, EPN, Estox, dithane (nabam), Lannate (methomyl), Nissol (MNFA based), and gramoxone (paraquat). These were power sprayed 55 times per year by men and 33 times by women. Illnesses included contact dermatitis, headaches, dizziness and nausea. However, the dermatitis was also induced by the leaves of the chrysanthemums, proven by patch tests. Subjective symptoms were susceptibility to fatigue, lumbago, shoulder discomfort, pruritus, and stomach disorders, the last two prevalent in men. Serum ChE activity during the October season was significantly lower in men and probably related to organophosphate pesticide application. No significant changes were found in liver function.

73-0079. Kambe, Y.; Ide, Y.; Takeshige, M. (Saku Gen. Hospital, Usuda-machi, Nagano Prefecture, Japan). **[Results of investigations of pesticide allergies by patch tests.]** *Nippon Noson Igakkai Zasshi (J. Jap. Ass. Rural Med.) 21(2): 238-239; 1972.* (Japanese)

Three groups of people were tested for pesticide allergies in Nagano prefecture where highland vegetables and chrysanthemums are grown. Group I consisted of 14 persons with contact dermatitis; Group II, 14 persons with acute intoxication symptoms such as headache, vomiting, nausea, abdominal pain, and dizziness; Group III, 12 persons without illnesses. Patch tests were made with the commonly used pesticides in Japan. Each pesticide was diluted with petroleum distillates to 0.1 and 0.01%, painted on a special adhesive tape, attached to healthy skin on the back of each subject, and removed after 26 hr. The skin was examined just after the tape removal and 24 hr later. Redness of the skin larger than 10 mm in diameter was considered a positive reaction. Percentages of positive results were 71% for Group I, 7% for Group II, and 58% for Group III. Positive results were obtained with 20 of the 50 pesticides. Although not all the positive readings are necessarily pesticide allergy indications, examination is needed.

73-0080. Takano, Y. (Group of Pestic. Intoxication Res., Akita-Prefectural Rural Med. Ass., Akita Prefecture, Japan). **[On the clinical cases of pesticide intoxication during the last 5 years in Akita Prefecture.]** *Nippon Noson Igakkai Zasshi (J. Japan. Ass. Rural Med.) 21(2): 240-241; 1972.* (Japanese)

Three hundred eleven cases of pesticide intoxication were studied over five years beginning in 1967. The age of the patients fell into two groups, 30-39 and 40-49. The numbers of cases (by pesticides) were: 47 by Blasticidin-S, 16 by nitrofen, and 15 each by fenitrothion and BHC, to name the most frequent. The findings reveal that organophosphate pesticides must be more carefully handled and antibiotics used for treatment of injuries; amounts of herbicides should be cautiously applied. The number of suicides and accidents suggests the mismanagement of pesticide distribution; cases of intoxication from application with subsequent eye injuries show the necessity for wearing protective goggles. In cases which occur other than during application, contact dermatitis is prevalent and seems to be caused by carelessly entering pesticide treated fields and orchards.

73-0081. Shinoda, H.; Ito, K.; Matsunaga, T.; Takada, T.; Nomura, T. (Dept. Intern. Med., Aihoku Hospital, Japan). **[Two suicides by acute pesticide intoxication.]** *Nippon Noson Igakkai Zasshi (J. Jap. Ass. Rural Med.) 21(2): 242; 1972.* (Japanese)

Two suicides, one by gramoxone (paraquat) and the other by dichlorvos, are reported. A male, age 74, prior to hospitalization after the diagnosis of diabetes mellitus and pulmonary tuberculosis, swallowed about 20 ml of gramoxone (24% solution). Two and a half hours later he was hospitalized. Examination revealed paleness, maintenance of consciousness, tachypnea, normal pulse, normal pupils, normal tendon reflex without pathological reflex, and occasional spasms of hands and legs. Treatment included gastric lavage, fluid supplementation, oxygen administration, injections of cardiotonics and prednisone (30 mg X 7 ampules). The patient died suddenly the next morning complaining of dyspnea. Autopsy revealed malignant chorioepithelioma and gastric cancer, the former metastatized to both lungs, liver, spleen, and bone marrow. In the second case a female, age 20, swallowed about 50 ml of dichlorvos (50% EC) and was treated immediately. Symptoms included unconsciousness, vomiting, and dyspnea, then respiratory paralysis, noticeable general cyanosis, normal pulse, miosis, and disappearance of light reflex, tendon reflex decreasing without pathological reflex. Treatment included gastric lavage, respiratory assistance, injections of atropine sulfate (48 ampules of 0.05%), pralidoxime (20 ml X 13 ampules), and prednisone (30 mg X 12 ampules). All therapeutic efforts failed and the patient died the next morning.

73-0082. Sugaya, A. et al. (Inst. of Rural Med., Hiraga Gen. Hospital, Akita Prefecture, Japan). **[Results of investigations of pesticide intoxication, especially those of medical examinations on the co-operative plant pest control groups.]** *Nippon Noson Igakkai Zasshi (J. Jap. Ass. Rural Med.) 21(2): 360-361; 1972.* (Japanese)

The results of medical examinations of members of co-operative plant pest control groups are given. Self-recorded health calendars from May-August, 1971, were used. Three medical examinations included general and specialized examinations and studies of urine, blood, and liver function. Of 371 members of the groups, the percentage of illness from pesticide application was 35.7 compared to 66.9, 43.1, and 40.4 for 1968, 1969, and 1970. Percentage of pesticide intoxication was 29.3 compared to 31.0, 32.2, and 33.9 for the above years. The major types of pesticides which caused intoxication

were organochlorines, herbicides, and organosulfates. The combined occurrence of general and local symptoms was seen. Seasonal changes of SGPT and serum ChE activity were not noticed. Dermatological examinations showed an increase (peak) in cases during July-August. The same tendency was seen in ophthalmological examinations.

73-0083. Sugaya, A. (Inst. of Rural Med., Hiraga Gen. Hospital, Akita Prefecture, Japan). **[On the chronic cases of disturbance due to organochlorine pesticides.]** *Nippon Noson Igakkai Zasshi (J. Jap. Ass. Rural Med.) 21(2): 362-363; 1972.* (Japanese)

Material on chronic intoxication by organochlorine pesticides was taken from the records collected by the Akita Rural Medical Association and from those of co-operative plant pest control groups. Dermatological and external ophthalmological findings and clinical cases of toxipathic hepatitis attributed to organochlorine pesticides were studied. Findings showed organochlorine pesticide related chronic eczema on hands and face and pannus, acula corneae, and leucoma of the eyes which resulted from repeated inflammations. A case of toxipathic hepatitis was also seen as organochlorine pesticide related. The patient was a 44 year old man and a technical expert with 17 years' experience in a fruit tree experimental station. He was hospitalized with complaints of general malaise, nausea, and eruptions on his back. The medical findings revealed incomplete liver function, lowered serum ChE activity, ophthalmological disturbances similar to those of PCB intoxication, and acneiform eruptions on the chest and back. Liver biopsy showed early indications of cirrhosis. Organochlorine residues in his blood were higher than in controls, especially β-BHC (0.029 versus 0.0084 ppm) and DDT (0.139 versus 0.0167 ppm).

73-0084. Konishi, Y. (Asahikawa Kosei Hospital, Hokkaido, Japan). **[Result of health examinations of persons engaged in pesticide application.]** *Nippon Noson Igakkai Zasshi (J. Jap. Ass. Rural Med.) 21(2): 368-369; 1972.* (Japanese)

Results of health examinations of persons (63 men and 85 women) in Wakkanai where health conditions are supervised are reported. The serum ChE activity was slightly lower than that of city-dwellers. Major pesticides and their number of applications during August, 1971, were organophosphate pesticides, 11 times, thiophanates, 17, and carbamates, 8. Subjective symptoms during pesticide applications were headache (25.9%), heavy feeling (18.5%), and skin injuries (14.8%). Hematological examinations before and just after pesticide application showed increased transferrin and decreased serum iron. Biochemical examinations showed large increases of SGPT and decrease of ChE activity in serum and erythrocytes.

73-0085. Sare, W. M.; Forbes, P. I. (Te Awamutu, New Zealand). **Possible dysmorphogenic effects of an agricultural chemical: 2,4,5-T.** *N. Z. Med. J. 75(476): 37-38; 1972.* (5 references)

A number of circumstances surrounding the births of several babies born with a gross myelo-meningocele and other abnormalities point to 2,4,5-T (with its toxic contaminant dioxin) as the fetotoxic agent. These were described in a Letter-to-the-Editor as: aerial spraying of the farms during the first trimester of each woman's pregnancy; domestic water supplies gathered from the roof; and, on one of the farms, the lowest annual calving rate from pregnancy-tested cattle. A neighbor who also had her farm sprayed during the first trimester of pregnancy but drew water from a well had a normal child. Calculations based on animal data show that about 8 millionths of a gram, at a particular time, would be sufficient to cause malformations, and after spraying, water from the roof could pick up sufficient quantities from accidental drift to produce a malformed baby. Precautions are given for pregnant women whose farms will be sprayed.

73-0086. Sare, W. M. (Te Awamutu, New Zealand). **The weedicide 2,4-D as a cause of headaches and diplopia.** *N. Z. Med. J. 75(478): 173-174; 1972.*

A Letter-to-the-Editor describes the correlation of occupational exposure to 2,4-D and headaches and double vision experienced by a healthy young man. The symptoms occurred only at the end of days during which he had sprayed 2,4-D. Confirmation of the diagnosis was given by an ophthalmologist who had seen a number of similar cases.

73-0087. Willett, L. B. (Dept. of Dairy Sci., Ohio Agr. Res. and Develop. Cent., Wooster, OH 44691). **Barrier coatings to prevent polychlorinated biphenyl (PCB) contamination of silage.** *Ohio Agr. Res. Develop. Cent. Summary No. 59; 1972; pp. 28-32.*

A number of coatings were tested as barriers to PCB migration from silo wall coatings containing PCBs to silage. Thick coatings and those employing solvents which do not dissolve PCBs were the most effective. Furfuryl- and hydraulic cement-type coatings presented the best barrier. The majority of contamination in all tests was found within 1 ft of the wall and at the base of the silo.

73-0088. Gulyas, L.; Zsiga, I.; Toth, G. (Medical Corps, Hungarian Army, Hungary). **Extrem mennyisegu atropinnal sikeresen kezelt organophosphat mergezesek. [Successful treatment of organophosphate poisonings with extremely large atropine doses.]** *Orv. Hetil. 113(14): 810-812, 815; 1972.* (32 references) (Hungarian)

Three cases of intentional poisoning with organo-

phosphate pesticides (methyl parathion and Lebaycid (fenthion)) were successfully treated with extremely high atropine doses. One patient with methyl parathion poisoning was treated with daily atropine doses of up to 192-240 mg (8-12 mg/h) over several days without developing symptoms of atropine poisoning. He received 1,900 mg of atropine during the first 11 days of the treatment and was released after 23 days having received a total of 2,621 mg of atropine. A follow-up control revealed no dysfunction. Another patient with methyl parathion poisoning showed temporary symptoms of slight atropinization and was released on the 26th day after receiving a total of 3,870.5 mg of atropine. A patient with Lebaycid poisoning was given a total of 6,461 mg of atropine with a maximum daily dose of 448 mg during the 29-day treatment. Toxogonin (obidoxime) was administered to all patients only during the initial phase of the treatment. Observations indicate that patients should be kept under permanent observation since miosis cannot be regarded as a reliable symptom. Cholinesterase activity values, especially of serious cases, are reliable only during the first 3-7 days of the poisoning. Poisonings by oral intake are most critical between the third and sixth days, which stresses the importance of thorough, repeated gastric lavage. Observations suggest that it is less hazardous to overdose than to use atropine in insufficient doses.

73-0089. Munoz Villegas, M.; Carcur Giacaman, E. (Hospital Exequiel Gonzalez Cortes, Servicio de Urgencia, Chile). **Intoxicaciones por pesticidas organofosforados en la infancia. [Organophosphate pesticide poisoning in children.]** *Rev. Chil. Pediat. 42: 361-364; 1971.* (Spanish)

Physiopathology and therapy of organophosphate (OP) pesticide poisoning are reviewed. An outline of the diagnostic and therapeutic procedures in use at the E. Gonzalez Cortes Hosp. is illustrated by two case histories. Diagnosis focuses on the clinical picture including information related to the incident. In cases of suspected OP-poisoning a fast therapeutic atropine test is substituted for the cumbersome serum cholinesterase determination. Failure of an atropinization reaction calls for immediate specific treatment including atropine administration in 1 to 2 mg doses every 5-10 min until mucosal dryness and tachycardia occur. From that time the same doses are administered on a half hour schedule. Pralidoxime iodide or chloride given in 25 to 50 mg/kg body weight doses in glucose solution once every 10 to 12 hr potentiates the effect of atropine and produces a rapid recovery of the erythrocyte cholinesterase. Decreased serum cholinesterase levels may persist for several weeks after the disappearance of the clinical symptoms, but are tolerated up to 30% below normal. One case history describes the accidental poisoning of a 20-month-old child with a combination of lindane and OP. The child was treated successfully with luminal and then with the specific OP antidotes. The other case is that of a 4-year-old child who had eaten insecticide contaminated grapes. The therapeutic atropine test and clinical picture suggested OP poisoning; the child died 4 hours after hospitalization and intense specific care.

73-0090. Alekseyeva, T. I.; Mishin, G. P.; Turkova, V. G. (Author address not given). **Organizatsiya nomoshchi bol'nym s otravleniyem granozanom. [Treatment of cases of Granosan poisoning.]** *Sov. Med. 5: 137-138; 1971.* (Russian)

Massive poisoning from granosan-treated sunflower-seeds is described. Forty-six patients who consumed such seeds for 4.6 weeks were hospitalized. While the poisonings were of slight to moderate intensity, most patients complained of discomfort, fatigue, disturbed sleep or somnolence, pains in the mouth, finger tremors, and nausea, vomiting, and diarrhea. Moderate tachycardia, transitory hepatomegalia, erythrocyte sedimentation rates of 30-60 mm/h, moderate hypochromic anemia, slight leukopenia, and proteinuria were observed. The urine contained mercury in concentrations of 0.005-0.06 mg/l. as well as leukocutes, erythrocytes, and hyaline casts. Treatment included forced diuresis and intramuscular administration of 5%-unithiol and of glucose, ascorbic acid, and vitamins B1, B6, and B12. The average hospital times for adults and children were 35.7 and 27.1 days.

73-0091. Inoue, Y. (Nat. Inst. of Prophyl. Hyg., Tokyo, Japan). **[Use of DDVP insecticide aerosols.]** *Nippon Iji Shinpo (Jap. Med. J.) 2525: 135; 1972.* (Japanese)

In reply to a reader's query, composition, toxicity, and safety recommendations are discussed for DDVP (dichlorvos) spray insecticides. Currently, a 0.3% solution of DDVP in kerosene is used for control of disease vectors within residences in Japan. Fenitrothion or diazinon may be added in some cases. DDVP-in-oil sprays are presumed to be of low persistence because of the high vapor pressure of DDVP. The acute oral LD50 in the mouse is 70 mg/kg; the dermal LD50, 250 mg/kg; and the LD50 by inhalation, 650 mg/kg. The LC10 by inhalation of kerosene for the mouse is 23,000 mg/m^3, but it is irritating to the eyes at lower concentrations. When spraying residences with DDVP preparations, it is advisable to remove fish and pets from the room and to cover all foods. The room should be closed off for a certain time period and when reopened should be ventilated before entering. Spraying near open flames must be avoided since the aerosol consists of very fine kerosene droplets.

See also 73-0009 73-0025 73-0124 73-0125

73-0092. Neal, R. A. (Dept. of Biochem., Vanderbilt Univ. Med. School, Nashville, TN). **Studies of the enzymatic mechanism of the metabolism of diethyl 4-nitrophenyl phosphorothionate (parathion) by rat liver microsomes.** *Acta Biochim. Iran. 7: 49-57; 1970.* (3 references)

Studies on the metabolism of parathion by rat liver microsomes have shown that two major oxidative products are formed, paraoxon and diethyl phosphorothionate. The formation of each of these compounds requires NADPH and molecular oxygen and is carried out by mixed function oxidases. A change in the electronic environment around the phosphorus affects the rates of reaction. Conversion of the sulfur compound to its oxygen analog is probably an overall detoxication since esterases in liver and blood can metabolize the toxic compound much more rapidly than the mixed function oxidases can produce it. Metabolism via the paraoxon route occurring near the nerve synapse may be responsible for the toxic reaction.

73-0093. Luppi Mosca, A. M.; Polimeno, M. (Cent. Stud., Micolog. Terr., CNR, Ist. Botan., Univ. Torino, Turin, Italy). **Azione *in vitro* di alcuni diserbanti su aspergilli e penicilli del terreno. [*In vitro* effects of some herbicides on soil *Aspergilli* and *Penicillia.*]** *Allionia 16: 25-32; 1970.* (19 references) (Italian)

The toxicity of 100-fold, 1000-fold, and 5000-fold dilutions of Legumin (2,4-DB sodium salt), Premerge (dinoseb), and Erbitox (DNOC) to cultures of *Aspergillus* and *Penicillium* species was investigated. Premerge was the most toxic compound toward *Aspergilli*, and Erbitox was the most toxic toward *Penicillium* species. The 100-fold dilution of each of the herbicides suppressed the growth of most of the *Aspergilli*; only *A. alliaceus, A. terreus,* and *A. flavipes* grew in the presence of this dilution of Legumin, while *A. ustus, A. flavipes,* and *A. fumigiatus* grew with Erbitox. All *Penicillia* except *P. lilacinum* continued to develop and sporulate in the presence of the 100-fold Legumin dilution, while only *P. citrinum, P. chrysogenum,* and *P. cyclopium* grew (but did not sporulate) in the presence of a similar level of Premerge. No *Penicillia* grew in the presence of Erbitox applied at this dilution. The 1000-fold dilution of Premerge prevented the development of *A. niger* only, while Erbitox inhibited the growth of *P. chrysogenum, P. notatum, P. cyclopius,* and *P. variabile.* The 5000-fold dilutions had no effects on the growth of the fungi tested.

73-0094. Hussain, S.; Ehrenberg, L.; Loefroth, G.; Gejvall, T. (Radiobiol. Dept., Wallenberg Lab., Univ. of Stockholm, Stockholm, Sweden). **Mutagenic effects of TCDD on bacterial systems.** *Ambio 1(1): 32-33; 1972.* (22 references)

Three test procedures for determining mutagenicity were run with 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) (dioxins). At a TCDD concentration of about 2 μg/ml and a survival level which excluded preferential selection of spontaneously occurring mutants, a high frequency of reversion to streptomycin independency in *E. coli* Sd-4 was observed. In two strains of *S. typhimurium* tested for reversion to histidine prototrophy, strain TA 1530 showed no mutation above the spontaneous level at concentrations of 1 and 10 μg/ml TCDD, and strain 1532 showed no mutations at 2 to 3 μg/ml. At higher concentrations and lower survival the mutation frequency increased. Acridine mustard gave similar results with the latter strain, although mutation frequencies were slightly lower. Prophage induction in *E. coli* K-39 was stimulated in the presence of TCDD and DMSO, but the effects of DMSO and TCDD were difficult to separate.

73-0095. Soedergren, A.; Ulfstrand, S. (Dept. of Anim. Ecol., Univ. of Lund, Lund, Sweden). **DDT and PCB relocate when caged robins use fat reserves.** *Ambio 1(1): 36-40; 1972.* (21 references)

Starvation of caged robins that had been pretreated with DDT or polychlorinated biphenyls (PCBs) increased residue levels in brain and breast muscles in terms of fresh weight or fat weight and in carcass in terms of fat weight. PCB and *p,p'*-DDT levels decreased in terms of fresh weight while *p,p'*-DDE residues did not change appreciably. Administered in combination with DDT, PCB did not affect the retention of *p,p'*-DDT and *p,p'*-DDE in the body. DDT and metabolites appeared to increase PCB uptake in all parts of the body examined, and much larger proportions were found in the brain and the breast muscles than in those of birds treated only with PCB. Changes in body weight did not differ between birds given DDT, PCB, or both in combination. Future studies of accumulation of pollutants in ecosystems should take into consideration synergistic effects of different substances taken up in combination.

73-0096. Cockrell, B. Y.; Hall, B. B.; Simon, J. (Dept. of Vet. Pathol. and Hyg., College of Vet. Med., Univ. of Illinois, Urbana, IL 61801). **Morphometric analysis of anthelmintic- and prednisolone-induced alterations in the ultrastructure of beagle liver parenchymal cells.** *Amer. J. Vet. Res. 33(4): 687-698; 1972.* (22 references)

Oral administration of dichlorvos to dogs at 44 mg/kg (therapeutic dose) resulted in a 46.2% increase in mean cytoplasmic area per hepatocyte and a significant decrease in average nuclear diameter of the cell. Greater numbers of mitochondria and microbodies were responsible for the increased area of the cytoplasm. Smooth endoplasmic reticulum was increased by about 100%. Similar changes were observed in dogs treated with a therapeutic dose of toluene-dichlorophen. Prednisolone treatment of dogs pretreated with dichlorvos resulted in changes in the ultrastructure of hepatocytes similar to

those seen with prednisolone alone, but the sharp reduction of smooth endoplasmic reticulum was partially counteracted and the increase in rough endoplasmic reticulum was enhanced. Whether the alterations caused by the three drugs regress after cessation of therapy is unknown. The anthelmintics may reduce the efficacy of drugs administered later.

73-0097. Johnson, A. E.; Van Kampen, K. R.; Binns, W. (Poisonous Plant Res. Lab., Vet. Sci. Res. Div., Agr. Res. Serv., U.S. Dept. of Agr., Logan, UT 84321). **Effects on cattle and sheep of eating hay treated with the triazine herbicides, atrazine and prometone.** *Amer. J. Vet. Res. 33(7): 1433-1438; 1972.* (8 references)

No adverse or toxic effects were observed in cattle and sheep fed grass that had been sprayed with atrazine or prometone, both at 22.5 and 44.9 kg/hectare. Body weight gains paralleled the amount of hay consumed, which was lower with prometone-treated hay and highly dosed atrazine-treated hay, probably because of low palatability. Serum glutamic oxalacetic transaminase, glutamic pyruvic transaminase and lactic dehydrogenase, total protein and blood hemoglobin concentrations, packed cell volume, and complete blood count were within the normal range or the range of controls. Liver, kidney, pancreas, spleen, adrenal gland, thyroid gland, lung, stomach, small and large intestine, and cardiac muscle showed no histopathologic changes. Comparison of results of this experiment with those of direct dosing experiments indicates that method of administration of atrazine and prometone is important. Partial or complete incorporation of the herbicides in plant tissue could have been responsible for their apparent reduced availability from treated hay.

73-0098. Saive, R. (Chaire de Microbiol., Fac. des Sciences Agronomiques de Gembloux, Gembloux, France). **Moyens d'etude microbiologique de la pollution des sols par les pesticides. [Microbiological approaches to the study of soil pollution from pesticides.]** *Ann. Gembloux 77(3): 245-257; 1971.* (18 references) (French)

Quantitative and qualitative effects of different pesticides on soil microorganisms are discussed. Pesticides chemically decomposed or adsorbed on soil colloids may serve as energy or carbon sources for certain microorganisms and cause considerable decrease of protozoa immediately after treatment, followed by rapid, intense proliferation. Insecticides usually have no effect on the number of microorganisms while aldrin and chlordane in a 1% concentration cause selective inhibition of gram-positive bacteria. Some pesticides such as paraquat stimulate the proliferation of bacteria such as *Arthrobacter*. While certain microorganisms can tolerate phenoxyacetic acid in concentrations 100 to 1,000 times the normal dose, considerable decrease in the total bacteria count over 2-3 months after treatment with dinoseb, EPTC, and dalapon is observed. Molds are usually more sensitive than bacteria to pesticides such as 5-nitrobenzotriazole. Nitrosobacteria and nitrobacter (e.g., Rhizobium) are sensitive to pesticides while ammonifying bacteria are fairly resistant. Fungicides are most dangerous to microorganisms and last 2-3 months. Diuron and neburon have usually no effect on nitrobacter which is completely inhibited by monuron. A method for determining pesticide toxicity to soil microorganisms is described. The method uses electrolytic titration for the carbon dioxide determination in the air, and ^{14}C labeled CO_2 for studies of the glucose catabolism.

73-0099. Briquet, M. (Lab. D'Enzymol., Univ. Louvain, Louvain, Belgium). **Action du ziram sur les fonctions mitochondriales. [The action of ziram on the mitochondrial functions.]** *Arch. Int. Physiol. Biochim. 80(1): 181-182; 1972.* (1 reference) (French)

Respiration rates of mitochondria, isolated from *S. cerevisiae*, were inhibited by ziram (in concentrations as low as 15 μmol) when studied in the presence of inorganic phosphate and of substrates such as α-ketoglutarate, pyruvate and malate, isocitrate, NADH, D-β-hydroxybutyrate, or D- or L-lactate. The inhibition was dependent on the length of time the mitochondria were preincubated with ziram. When α-glycerophosphate was used as a substrate, mitochondrial respiration was scarcely affected. 2,4-Dinitrophenol-uncoupled respiration was slowed and not susceptible to ADP stimulation in the presence of the fungicide, indicating that inhibition of the respiratory control had occurred. Slight susceptibility of ATP-ase to ziram and mitochondrial swelling inhibition produced by the fungicide were ascertained. No respiratory control inhibition occurred in rat liver and beef heart mitochondria when ziram was applied in the presence of succinate.

73-0100. Awad, O.; Gabr, Y.; Osman, M. (Fac. of Sci., Alexandria Univ., Alexandria, U.A.R.). **Phosphorylation and affinity constants of the inhibition of brain acetylcholinesterase by organophosphorus anticholinesterases.** *Arzneim. Forsch. 22(6): 1035-1037; 1972.* (14 references)

The affinity constants and phosphorylation rates of AChE by EPN and malathion were investigated. In addition, the corresponding binding and carbamylation constants of eserine were studied for comparison. The results indicate that EPN reached the active site about 28 times faster than malathion. The rates of phosphorylation of EPN and malathion were of the same order of magnitude as the carbamylation rate of eserine.

73-0101. Ishiguro, T.; Toyada, I.; Saito, T. (Aburabi Labs., Shionogi & Co., Shiga Prefect., Japan). **[Fundamental investigations on the application of systemic insecticides (IV). Residues and half-life of vamidothion**

in spinach.] *Bochu Kagaku (Sci. Pest Contr.) 37(3): 111-115; 1972.* (14 references) (Japanese)

Laboratory-grown, 46-day-old spinach plants were sprayed with a diluted emulsion of [^{14}C-methyl]-vamidothion at ca. 0.08 g active ingredient/m^2 soil surface, and 10-g leaf samples analyzed for vamidothion residues at various times after treatment. Leaf samples were extracted with acetone, then the solvent evaporated and the residue extracted successively with chloroform and with water. The radioactivity present in the chloroform-extractable material represents the active, insecticidal ingredient, whereas the water-soluble fraction represents inactive metabolites. The chloroform-extractable quantities were 0.887, 0.519, 0.198, 0.129, and 0.057 ppm on days 0, 3, 56, 12, and 20 after treatment; the water-extractable fractions on those days amounted to 0.295, 0.216, 0.178, 0.119, and 0.081 ppm respectively. The half-life of the chloroform-extractable residue was 11.9 days, and that of the total residue, 20 days. When these values are corrected for the dilution due to the rapid growth of the plant, the effective half-life of the active ingredient in the spinach plant is calculated as 5.4 ±1.3 days.

73-0102. Bajgar, J. (Purkyne Med. Res. Inst., Hradec Kralove, Czechoslovakia). **Time course of acetylcholinesterase inhibition in the medulla oblongata of the rat by *O*-ethyl *S*-(2-dimethylaminoethyl)methylphosphonothioate *in vivo*.** *Brit. J. Pharmacol. 45(2): 368-371; 1972.* (10 references)

AChE inhibition was studied in three parts of the medulla oblongata of the rat following intramuscular administration of 0.035 mg/kg *O*-ethyl-*S*-(2-dimethylaminoethyl)methyl-thiophosphate(EDMM). This dose produced alteration of respiration and fasciculation in 10 min, followed by convulsions and death within 30 min. At 10, 20, and 30 min AChE inhibition was not uniform in different parts of the medulla oblongata. Activity of AChE in part A was about 10% of controls at the time of death, whereas 30 to 60% of control activity was observed in the other two parts. The results suggest that EDMM penetrates individual parts of the brain at different rates.

73-0103. Meyrick, B.; Miller, J.; Reid, L. (Dept. of Exp. Pathol., Inst. of Dis. of the Chest, Brompton Hospital, London S.W.3, England). **Pulmonary oedema induced by ANTU, or by high or low oxygen concentrations in rat—an electron microscopic study.** *Brit. J. Exp. Pathol. 53(4): 347-358; 1972.* (33 references)

Electron microscopy was used to follow the development of ANTU-induced lung edema and pulmonary changes resulting from hyper- and hypoxic conditions. Dose related (3, 10, or 50 mg/kg) interstitial edema and blebbing and scalloping of endothelial cells were observed within 2 hr of intraperitoneal administration of ANTU. Epithelial damage was apparent after 6 hr in animals treated with 50 mg/kg. Alveolar size and distribution of alveolar lining cells were not altered. The breathing rate in treated rats was slow initially and after 3 hr increased well above normal levels. A somewhat slower response was observed in rats exposed to 99% O_2 at 1 atm., with endothelial and epithelial damage observed at 24 hr. The same effects were not produced by hypoxic conditions.

73-0104. Bhatia, S. C.; Sharma, S. C.; Venkitasubramanian, T. A. (Dept. of Biochem., Vallabhbhai Patel Chest Inst., Univ. of Delhi, Delhi-7, India). **Effect of dieldrin on certain enzyme systems of rat liver.** *Brit. J. Exp. Pathol. 53(4): 419-426; 1972.* (33 references)

The activities of hexokinase and glucokinase were reduced 42% and 32%, respectively, on a protein basis in livers of rats treated with a single oral dose of 30 mg/kg dieldrin. On a protein basis all pyridine nucleotide-linked dehydrogenases studied had elevated activities in treated animals. The data suggest stimulation of gluconeogenesis by the insecticide. Mitochondrial isocitrate dehydrogenase was inhibited when expressed on tissue weight or protein basis. Significant decreases in hepatic succinate dehydrogenase were also brought about by dieldrin. Low alkaline phosphatase was observed, and dieldrin enhanced the activity of hepatic adenosine triphosphatase by about 50%, 90%, and 40% on a tissue wt., body wt., and protein basis, respectively, indicating impairment of liver function and altered mitochondrial morphology.

73-0105. Whitehead, C. C.; Pettigrew, R. J. (Agr. Res. Council's Poultry Res. Cent., Edinburgh, EH93JS, Scotland). **The effect of 2,4-dichlorophenoxyacetic acid on laying hens.** *Brit. Poult. Sci. 13(3): 191-195; 1972.* (5 references)

Levels equivalent to 50 and 150 mg 2,4-D/kg diet administered daily to hens, age 28-48 wk, had no obvious adverse effects on the birds or on egg production. The mean percentage egg productions were 59.3, 62.3, 62.8, and 60.4% for control hens (A), hens treated with 6.2 mg 2,4-D (B), and hens treated with 18.7 mg 2,4-D (C), respectively. Weekly mean egg weights of group B were consistently significantly higher than those of group A. Group C mean egg weights were not significantly different from those of A or B. No effect of treatment was observed on yolk weight. Mean shell thickness declined gradually in all groups, probably because of aging. Average hatchabilities of fertile eggs for groups A, B, and C were 61, 54, and 67%, respectively, and did not differ significantly. Hatching chicks were apparently normal.

73-0106. Ferrando, R. (Lab. de Nutrition et d'Alimentation, Ecole Nationale Veterinaire, Alfort, France). **Influence du DDT sur la mise en reserve hepatique de la**

vitamine A. [Influence of DDT on the hepatic storage of Vitamin A.] *Bull. Acad. Nat. Med. 155(5): 117-120, 1971.* (6 references) (French)

The influence of DDT and monobromobenzene on the hepatic storage of Vitamin A was studied in male Wistar rats. The animals were fed a standard diet with low Vitamin A content and 15% raw protein, enriched with 0.3% dl-methionine, plus 5 mg of DDT per day over 11 days. DDT was subsequently replaced by daily 50 μg-doses of Vitamin A for eight days. The hepatic storage of Vitamin A decreased; the difference between tests and controls failed to be significant due to the effect of methionine. In another experiment where the rats were fed the same standard diet without dl-methionine, a ten-day treatment with 5 mg-doses of DDT daily was followed by the administration of 50 μg-doses of Vitamin A daily for seven days. The percentage of the Vitamin A stored in the liver (2.63%) was significantly lower than in the control group (4.92%).

73-0107. Rousseau, M.; Pourtallier, J.; Taliercio, Y. (Lab. de Recherches Vet., Nice, France). **Causes de pollution des oeufs et des viandes de la Poule domestique (*Gallus-Gallus* L.) par des residus de pesticides organochlores. [Causes of pollution of eggs and meat of domestic chickens (*Gallus gallus* L.) with chlorinated hydrocarbons.]** *Bull. Acad. Vet. Fr. 45(1): 39-45; 1972.* (2 references) (French)

Experiments were conducted to determine the relative importance of various pollution sources in the contamination of poultry products by pesticides. Chickens received diets naturally containing BHC or spiked with BHC at levels which could result from grain fumigation. The subsequently laid eggs had BHC contents which increased until a plateau was reached, dependent on the BHC ingestion rate. BHC concentrations in the fat, and not in the internal organs, were proportional to the concentrations in the eggs. In a second experimental series, henhouses were fumigated with two types of insecticides, type I containing BHC and 8-quinolinol, and type II containing ronnel. Each of these fumigants was inadvertently contaminated with other pesticides. Analysis of eggs laid after fumigation with type I revealed a gradual increase in BHC, dieldrin, and DDT levels up to day 38, followed by a slow decrease to a plateau by day 52. Ronnel residues were not found after fumigation with type II, but BHC residues in the eggs increased up to the 21st day. Pesticide levels in meat and organs from chickens from fumigated hen houses were higher than those attained in the feeding experiments.

73-0108. Lacassagne, A. (Inst. du Radium, Paris, France). **Revue critique des tumeurs experimentales des cellules de Leydig, plus particulierement chez le rat. [A critical review of experimentally produced Leydig cell tumors, particularly in the rat.]** *Bull. Cancer 58(2): 235-276; 1971.* (158 references) (French)

Studies are reviewed concerning the production of Leydig cell tumors in rats by various procedures such as prolonged enteral administration of TDE (*o,p'*-DDD). TDE administered daily to Wistar rats produced testicular interstitial tumors after 10 months. In another experiment hypertrophy of the interstitial tissue leading to tumor formation, destruction of the seminal epithelium, thickening of the albugineum, and tumor development occurred after 285-348 days of daily doses of 0.6 mg/kg. Genesis of Leydig cell tumors seems to involve changes in the intratesticular circulation (sclerosis of the albugineum and degeneration of the seminal epithelium with accumulation of the interstitial fluid in the intertubular space as a result), and another general factor of neurohormonal nature. Spermatogenesis is maintained over 12 months, probably due to Sertoli cells being unaffected. The results suggest slight, specific carcinogenicity of TDE in the interstitial gland where the destroyed Leydig cells are regenerated by mesenchymal elements. Long latency of mostly benign tumors with very limited metastasis also occurs with TDE. Hypertrophy, Leydig cell tumor formation, and degeneration of the seminal epithelium are preceded by alternate atrophic and regenerative processes, accompanied by reversible alterations in the spermatogenesis. TDE also has a toxic effect on the adrenal cortex through the inhibition of the conversion of pregnenolone into progesterone, probably due to blocking of 3-β-hydroxysteroid dehydrogenase. Results from experiments on mice suggest another hypothesis on the pathogenesis of Leydig cell tumor focusing on the adrenogenital syndrome leading to the genesis of tumor clones from mesenchymal cells, regenerators of the interstitial cells of the testis destroyed experimentally.

73-0109. Semencheva, E. M.; Rodionov, G. A.; Kuznetsova, L. I.; Bebeshko, V. G. (Dept. of Allergology, All-Union Research Inst. of Hyg. and Toxicol. of Pestic., Polymers and Plastics, Kiev, USSR). **Mekhanizm deystviya na organizm propazina–soyedineniya gruppy simmetrichnykh triazinov. [Action mechanism of propazine–a compound of the symmetrical triazine group–on the organism.]** *Byull. Eksp. Biol. Med. 73(6): 47-51; 1972.* (19 references) (Russian)

The chronic effects of daily 500 mg/kg-oral doses (one-tenth LD50) of propazine (2-chloro-4,6-bis(isopropylamino)*sym*-triazine) on chinchilla rabbits were studied in a four-month experiment. Hematological investigations revealed hypochromic macrocytic anemia, degeneration of erythrocytes and macrocytes, increased erythrocyte sedimentation rate, severe reticulocytosis, leukopenia, increased eosinophil and proerythroblast counts, the presence of giant myelocytes and metamyelocytes, inhibition of myelopoiesis, and increased production of fetal hemoglobin, as well as reduced soluble protein, DNA, and RNA levels in the bone marrow. Erythrocyte antibodies appeared on the 30th day of the experiment. Anemia of the internal organs, slight to

moderate atrophy of the lymph nodes, hepatomegaly, flaccid abdominal wall, distension of the large intestines, micronecrosis and hydropic or fatty degeneration of the liver, edema of the bone marrow, and decreased numbers of hemopoietic elements were observed. Hemosiderin depositions in the spleen and edematous stroma in the lymph nodes as well as the gastric and intestinal mucosa were determined. Suppurative bronchitis; lobar, serofibrinous or suppurative pneumonia; and a few cases of focal hemorrhages in the white substance of the brain and in myocardium and kidneys were observed. None of the above symptoms were seen in another group treated simultaneously with equal doses of propazine and exogenous thymidine. An autoimmune mechanism is suggested.

73-0110. Vasilos, A. F.; Dmitriyenko, V. D.; Shroyt, I. G. (Immunomorph. Lab., Moldavian Hyg. and Epidemiol. Inst. Kishinev, USSR). **O kolkhitsinopodobnom deystvii Sevina na kul'turu fibroblastov embriona cheloveka. [Colchicine-like action of Sevin on the culture of human embryo fibroblasts.]** *Byull. Eksp. Biol. Med. 73(6): 91-93; 1972.* (7 references) (Russian)

The effect of Sevin (carbaryl) was studied *in vitro* on human embryo fibroblasts at 20, 40, and 80 μg/ml culture medium. Increased numbers of pyknotic nuclei and degenerated cells were observed as well as increased eosinophilic granulation of the cytoplasm in proportion to dose and incubation time. Inhibition of the mitotic activity after 24 hour incubation, and delayed cell mitosis and division in metaphase were found at all three Sevin concentrations. The mitotic activity was totally suppressed by 80 μg/ml after 48 hr of incubation. The abnormal ratios of the mitotic phases (gradual decrease in the number of cells in prophase, anaphase, and telophase, and increased metaphase) observed at concentrations of 20 and 40 μg/ml normalized by the 48th hr. The percentage of pathological forms of mitosis (K-mitosis and degenerative forms) increased to 97%. The above changes reached their maxima after 24 hr of incubation.

73-0111. Bollag, J. M.; Liu, S. Y. (Lab. of Soil Microbiol., Dept. of Agron., Pennsylvania State Univ., University Park, PA). **Fungal degradation of 1-naphthol.** *Can. J. Microbiol. 18(7): 1113-1138; 1972.* (14 references)

The biological degradation of 1-naphthol was studied during growth, with replacement cultures and cell extracts of the fungus *Fusarium solani*. Radioactivity of 1-napthol-1-^{14}C disappeared partially during growth, but it was completely dissipated by cell-extract activity. More than 80% of $^{14}CO_2$ evolved was collected after 60 min incubation in a cell-extract experiment. The active enzymes seem to be constitutive inasmuch as 1-naphthol was metabolized with cells which were not cultured on an inducing substrate. No difference in activity could be observed between cell-free extracts prepared from spores or mycelium of the fungus. (Author abstract by permission)

73-0112. Khan, M. A.; Harries, W. N.; Dorward, W. J. (Res. Station, Canada Dept. Agr., Lethbridge, Alberta, Canada). **Systemic insecticide toxicity in cattle and its prevention in southern Alberta.** *Can. Vet. J. 13(6): 129-134; 1972.* (19 references)

Poisoning was observed in 74 out of 1,198 steers treated with crufomate and 11 out of 890 treated with trichlorfon in southern Alberta. The preparations were systemics and were administrered before the Nov. 30 deadline to treat cattle grubs. Acute esophagitis and ruminal tympany were observed in cattle treated with crufomate; at necropsy lesions were seen in the esophagus and lungs of three of the animals. Histopathological studies showed inflammatory changes in the esophagus. Proteolytic enzymes contained in the first-stage warble larvae lodged in the esophagus were probably responsible for symptoms along with cholinergic effects of the drug. Trichlorfon-treated animals had posterior paralysis and lesions in the spinal canal and perivertebral tissue of the animals. Degenerative changes in the spinal cord occurred. Neurotoxicity rather than trauma caused by proteolytic enzymes disgorged by *H. bovis* larvae was probably responsible for the signs observed. Oct. 30 is suggested as a better deadline for treatment.

73-0113. Pujman, V.; Schmidt, P.; Somora, J.; Pfeifer, I.; Fiala, J.; Viktora, L.; Cernochova, S. (VUFB, Prague, Czechoslovakia). **Vliv nekterych pesticid a elektrarenskeho popilku na nektere ukazatele krvetvorby mysi. [The effect of some pesticides and power-plant fly ash on some hematopoietic indices in mice.]** *Cesk. Hyg. 17(2-3): 64-69; 1972.* (10 references) (Czech)

Hematopoietic indices in mice were examined before and after 2 week administration of 500 or 100 μg-% Dykol 50(DDT), or 10 or 50 μg-% endrin-20, in the drinking water. Other mice were examined after administration of 0.1, 5, and 1% suspensions of power-plant fly ash in the drinking water for 29 days and the results compared with those following subcutaneous injections of cyclophosphamide solutions in rats. Both concentrations of endrin significantly reduced the erythrocyte counts and the absolute neutrophil counts, slightly increased the reticulocyte counts, had no effect on the leukocyte counts, and noticeably increased the rate of erythropoiesis in bone marrow. Similar effects were observed with the higher DDT concentration, whereas the lower concentration of DDT merely caused a significant reduction in the erythrocyte count. The absolute neutrophil count was significantly reduced in the mice given the fly-ash suspensions while the leukocyte and erythrocyte counts remained unchanged and bone marrow erythropoiesis was enhanced. These findings were similar to those obtained with cyclophosphamide.

thus indicating that stimulation of erythropoiesis is a nonspecific response to a foreign substance in the body.

73-0114. Hendrichova, E.; Mayer, J.; Kortus, J. (Katedra Hygieny Lekarskej Fakulty University Karlovy, Bratislava, Czechoslovakia). **Sledovanie radioizotopu fosforu po aplikacii ^{32}P znackovaneho fenitrotionu na pokozku potkanov. [Distribution of radioactive phosphorus after application of ^{32}P-labeled fenitrothion on the skin of rats.]** *Cesk. Hyg. 17(4-5): 172-176; 1972.* (11 references) (Slovak)

The penetration of the spray insecticide fenitrothion through the intact skin of rats was followed by applying a solution or radio-labeled fenitrothion in olive oil, specific activity 0.14 mCi/ml, to the shaved skin on the back of rats. Residual radioactivity was measured after 1, 3, 6, and 24 hours, following the removal of excess of fenitrothion from the skin surface. The greatest decrease in the quantity of the insecticide applied occurred one hour after application, and penetration amounted to 1.09%. According to macroautoradiographic studies, after three hours the bulk of the absorbed insecticide was still found in the skin tissue, but some insecticide was also detected in the urogenital tract of the rats. Residues of the isotope were still present in skin tissue 51 hours after application, but the main portion was deposited in the cartilaginous parts of bones. The insecticide is continuously released into the body from its original site of deposit in the skin tissues, in its original or metabolized form.

73-0115. Ahmad, S.; Knowles, C. O. (Dept. of Entomol., Univ. of Missouri, Columbia, MO 65201). **Biochemical mode of action of tricyclohexylhydroxytin.** *Comp. Gen. Pharmacol. 3(10): 125-133; 1972.* (22 references)

Following acute administration of tricyclohexylhydroxytin (Plictran) and triphenylhydroxytin (Du-Ter) toxicity was low in mice and houseflies. Du-Ter was moderately toxic to spider mites, while Plictran was quite toxic to mites with 24-and-48-hr contact LC50 values of 285 and 150 μg/g, respectively. Plictran was slow acting and did not yield discernible symptoms of poisoning preceding a moribund state in houseflies and mites. Mouse and housefly ATPases were inhibited to about the same degree by the two pesticides and by oligomycin. The pI50's were 6.2 and 6.1 for Plictran and 6.2 and 6.0 for Du-Ter. No detectable inhibition was observed in various fractions of two spotted spider mite homogenates with either compound in the range of 10^{-8} to 10^{-5} *M*. No ATPase inhibition was detected *in vivo* in mice and houseflies 8 hr after treatment, but 31% inhibition in mice and 13% in houseflies was observed at 24 hr.

73-0116. Lech, J. J.; Costrini, N. V. (Dept. of Pharmacol., Med. College of Wisconsin, Milwaukee, WI 53233). ***In vitro* and *in vivo* metabolism of 3-trifluoromethyl-4-nitrophenol (TFM) in rainbow trout.** *Comp. Gen. Pharmacol. 3(10): 160-166; 1972.* (18 references)

Reduction of TFM to 3-trifluoromethyl-4-aminophenol (RTFM) by trout liver homogenates was approximately linear over a 2-hr period and was greatly stimulated by the addition of FAD. Omission of $NADP^+$ and FAD from liver or kidney homogenates reduced activity, but omission of glucose-6-phosphate, glucose-6-phosphate dehydrogenase, and niacinamide had little or no effect. Liver activity was about eight times that of kidney. RTFM was acetylated by liver and kidney extracts when acetyl-CoA was added to the mixture. *In vitro* formation of TFM glucuronide was demonstrated utilizing liver extracts, UDPGA, and saccharo-1,4-lactone. Glucuronidation *in vitro* occurred at a rate 10 times that of reduction. Exposure of trout to ^{14}C-TFM consistently resulted in only one metabolite, TFM glucuronide.

73-0117. Peaslee, M. H.; Goldman, M.; Milburn, S. E. (Dept. of Biol., Univ. of S. Dakota, Vermillion, SD 57069). **Effects of acute and chronic administration of DDT upon pituitary melanocyte-stimulating hormone (MSH) activity.** *Comp. Gen. Pharmacol. 3(10): 191-194; 1972.* (10 references)

Rats fed 500 ppm DDT in the diet showed a significantly increased pituitary MSH activity after 1 mo, but the level returned to normal after 2 mo. Following a single oral dose of 100 mg/kg DDT, severe generalized tremors occurred,and a sharp significant decrease in pituitary MSH activity was observed 4 hr post administration. After 72-96 hr the activity had increased to a level significantly higher than that of controls. Three of the animals died before the 24-hr autopsy. The effect seen with an acute dose of DDT was probably a reflection of the response of the hypothalamus, which caused a liberation of pituitary MSH. Compensatory synthesis and accumulation of the hormone apparently result from continued administration of DDT.

73-0118. Izmirova, N.; Kaloyanova, F.; Ivanova-Chemishanska, L. (Joint Res. Inst. of Hyg. and Industrial Safety, Bulgaria). **Studies of the isoenzymes of lactate dehydrogenase, indoxyl acetate and β-naphthyl acetate esterase activity upon experimental intoxication with maneb.** *C. R. Acad. Bulg. Sci. 25(6): 861-863; 1972.* (12 references)

Changes were observed in rat kidney lactic dehydrogenase (LD) from animals poisoned by inhalation of maneb over a period of 4.5 mo. Changes included a lowering of LD_1, the organospecific fraction for kidney, and a rise in LD_4. No deviations were observed in LD from brain, and LD extract from liver was

variable but tended to show a rise in LD_5 activity. Indoxyl acetate and β-naphthyl acetate esterases were not affected in any of those organs or in serum. The relative activity of LD_1, LD_2, and LD_4 increased in serum after maneb intoxication. The results suggest that changes in the isoenzyme spectrum of LD in serum after maneb intoxication are a reflection of pathological lesions in several organs.

73-0119. Lutz-Ostertag, Y.; Didier, R. (Lab. de Biol. animale, Univ. de Clermont, Aubiere, France). **2,4,5-T et sterilite embryonnaire. [2,4,5-T and embryonal sterility.]** *C. R. Soc. Biol. 165(12): 2364-2366; 1971.* (7 references) (French)

The effects of 2,4,5-T (trichlorophenoxyacetic acid) on the embryonal development of chickens were studied. Hens' eggs were immersed in aqueous suspensions of 0.2, 0.3, 0.4, and 1.0% 2,4,5-T, 15-30 min prior to incubation. A dose-dependent increase in the embryonal mortality was observed, especially between the third and fifth and the tenth and fifteenth days of the incubation (about 25% and 33-35% due to concentrations of 0.4 and 1.0% respectively). Inhibited growth and muscular atrophies of extremities as well as nervous lesions were determined. However, the hormonal and mitotic damages, manifested by sterility or greatly reduced fertility, were serious. Small, granular and flattened testicles of irregular, atypical shape; very thick, irregular, and vacuolated albuginea; the absence of gonocytes in many testicular tubules; and incomplete regression of the mullerian ducts were observed. The transparent fimbria ovarica was often absent as were the ovarian cortex, Pfluger's tubes, and gonocytes in females. Hypertrophic gonocytes and vacuolated Pfluger's tubes were also found. One third of all females were sterile and the rest had greatly reduced fertility.

73-0120. Wysocka-Paruszewska, B. (Dept. of Toxicol. Chem., Med. Acad., Warsaw, Poland). **The changes in the urine level of 4-hydroxy-3-methoxymandelic acid in rats related to the degree of intoxication with Di-Syston.** *Diss. Pharm. Pharmacol. 23(3): 271-275; 1971.* (11 references)

An increase in the excretion of 4-hydroxy-3-methoxymandelic acid (HMMA), dependent on but not proportional to an oral dose of Di-Syston (disulfoton), was observed in male and female rats. Peak excretion of HMMA occurred during the second day. Normal values were obtained by the 5th day in animals receiving 0.4 and 0.3 of the LD50 dose and by the 4th day in rats poisoned with 0.2 and 0.1 LD50. The results indicate that the increase in excretion of HMMA is directly related to the mechanism of action of disulfoton.

73-0121. Hurlbert, S. H.; Mulla, M. S.; Willson, H. R. (Dept. of Biol., San Diego State College, San Diego, CA 92115). **Effects of an organophosphorus insecticide on the phytoplankton, zooplankton, and insect populations of fresh-water ponds.** *Ecol. Monogr. 42(3): 269-299; 1972.* (80 references)

A detailed study of 12 experimental ponds, eight of which were treated three times with Dursban (chlorpyrifos) (0.025 lb/acre or 0.25 lb/acre), showed that the insecticide stimulated algal blooms and reduced predaceous insect populations to cause an ecological imbalance apparently favorable to the insects it was meant to control. Greater reductions of predaceous rather than of "herbivorous" insects were observed in samples taken 24 hr after the 2nd and 3rd treatments. Five wk after the last application of Dursban, predaceous insect populations averaged only 45% and 9% as abundant (in the low and high dose ponds) as in control ponds. Herbivorous insects in treated ponds at that time averaged 108% and 206% as abundant as those in control ponds. *Cyclops vernalis* and *Moiva micrura*, the only crustacean zooplankters present, experienced high mortality and variable recovery in treated ponds. *Diaptomus pallidus* populations were unaffected at the low dose, but increased when *Cyclops* populations decreased. *Ceriodaphnia* sp. never became abundant in treated ponds. Herbivorous rotifers were abundant in control ponds only during July, but increased dramatically in treated ponds 1 to 3 days after *Moina* and *Cyclops* populations were reduced by Dursban. Planktonic rotifers were more abundant in treated ponds and benthic-littoral rotifers were more abundant in control ponds. *Asplanchna brightwelli* was 35 times more abundant in treated ponds than in control ponds. Blooms of blue-green algae and the diatom *Synedia* were found in some treated ponds.

73-0122. Guilbault, G. G.; Lozes, R. L.; Moore, W.; Kuan, S. S. (Dept. of Chem., Louisiana State Univ., New Orleans, LA 70122). **Effects of pesticides on cholinesterase from aquatic species: crayfish, trout and fiddler crab.** *Environ. Lett. 3(4): 235-245; 1972.* (12 references)

Inhibition of cholinesterase from trout brain (AChE), crayfish nervous system (AChE), and whole fiddler crabs (BuChE) was studied in the presence of 19 pesticides in order to determine the possibility of developing an enzymic assay for these compounds. The trout enzyme was insensitive to the organochlorines and to the organophosphates tested, except for methyl parathion and dichlorvos. Mesurol (methiocarb), Baygon (propoxur), Matacil (aminocarb), and Zectran inhibited it selectively, with I50 values ranging from $1 \times 10^{-5} M$ to $1 \times 10^{-2} M$. The carbamates Matacil, Mesurol, and Zectran, along with dieldrin, paraoxon, and methyl parathion inhibited crab ChE. Crayfish ChE was very sensitive to paraoxon and Mesurol and as little as 0.02 ppb could be detected. As little as 1 ppb of parathion, aldrin, and Baygon could also be determined with this enzyme.

73-0123. Lauwerys, R.; Buchet, J.-P. (Univ. Catholique de Louvain, Unite de Toxicol. Industrielle et Pathol. du Travail, 1200 Bruxelles, Belgium). **Effect of two organophosphorus esters on mammary carcinogenesis by 7,12-dimethylbenz(a)anthracene in rats.** *Eur. J. Toxicol. 5(3): 163-167; 1972.* (9 references)

The effect of two organophosphates on the development of mammary tumors induced by 7,12-dimethylbenz(a)anthracene in rats was investigated. Administration of parathion intraperitoneally at 0.5 mg/kg twice weekly for 12 wk and then at 1 mg/kg three times a week for 11 wk did not alter tumor incidence. Animals given triamiphos at 20 ppm in the food had fewer tumors than controls. Inhibition of lipolysis by triamiphos may in part be responsible for this effect. Reduced red blood cell ChE was observed with both pesticides.

73-0124. Egyed, M. N.; Bogin, E. (Kimron Vet. Inst., Bet Dagan, Israel). **Biological-biochemical method for the diagnosis of fluoroacetamide poisoning. I. Citric acid.** *Fluoride 5(3): 132-135; 1972.* (10 references)

Intraperitoneal injection of concentrates of tissue and urine from sheep experimentally poisoned with fluoroacetamide induced a 2.4- to 8.5-fold increase in citric acid in guinea pig kidney, depending on the tissue used and storage conditions. Injection of muscle extract gave the highest response to a tissue. Normal sheep tissue extracts did not induce an increase in guinea pig kidney citric acid. This method was found suitable for supporting diagnosis of field cases of fluoroacetamide poisoning when samples were obtained as long as 48 hr after death in hot weather without refrigeration.

73-0125. Bogin, E.; Egyed, M. N.; Shlosberg, A. (Kimron Vet. Inst., Bet Dagan, Israel). **Biological-biochemical method for the diagnosis of fluoroacetamide poisoning. II. Certain enzymes and electrolytes.** *Fluoride 5(3): 136-144; 1972.* (20 references)

Serum levels of isocitric dehydrogenase, lactic dehydrogenase, and sorbitol dehydrogenase showed a dose-related increase in guinea pigs given 1-20 mg/kg of fluoroacetamide. Levels of isocitric dehydrogenase, sorbitol dehydrogenase, lactic dehydrogenase, and other enzymes increased, and showed proportionality to the time after administration of a poisonous dose. Elevation of isocitric dehydrogenase and sorbitol dehydrogenase levels, but not of lactic dehydrogenase, was observed in serum of guinea pigs treated with tissue extracts from fluoroacetamide-poisoned sheep, a useful finding for diagnostic purposes. Poisoned guinea pigs displayed toxic degeneration of the liver cells.

73-0126. Bratt, H.; Daniel, J. W.; Monks, I. H. (Imp. Chem. Industries, Ltd., Ind. Hyg. Res. Lab., Alderley Park, Nr. Macclesfield, Cheshire, England). **The metabolism of the systemic fungicide, dimethirimol, by rats and dogs.** *Food Cosmet. Toxicol. 10(4): 489-500; 1972.* (12 references)

The metabolic fate of the systemic fungicide, dimethirimol, has been investigated in rats and dogs. Following the administration of a single oral dose of dimethirimol, labeled at C2 in the heterocyclic ring, most of the radioactivity is excreted in the urine within 48 hr. The pattern of urinary metabolites is complex, although the major metabolites, which account for 75 and 55% of the dose in rats and dogs, respectively, occur as a result of sequential dealkylation and/or penultimate hydroxylation of the *N*-dimethylamino and *n*-butyl substituents. A major metabolite found predominantly in bile was identified as a glucuronic-acid conjugate of dimethirimol. No significant qualitative interspecies differences in metabolism were observed. Dimethirimol does not accumulate in rat adipose tissue. (Author abstract by permission)

73-0127. Nagasaki, H.; Tomii, S.; Mega, T.; Marugami, M.; Ito, N. (Dept. of Hyg., Nara Hyg. Inst., Nara Med. Univ., Kashihara, Nara 634, Japan). **Hepatocarcinogenic effect of α-, β-, γ-, and δ-isomers of benzene hexachloride in mice.** *Gann (Cancer) 63(3): 393; 1972.* (1 reference)

The α-isomer of BHC induced hepatomas in mice fed 500 or 250 ppm in the diet for 24 wk. The high dose resulted in enlarged livers with a rough irregular surface containing many yellowish nodules up to 2.0 cm in diameter. Yellowish nodules up to 0.3 cm in diameter were observed in the 250 ppm group. A level of 100 ppm α-BHC in the diet did not have the same effects, and no carcinogenic effects were observed with the β-, γ-(lindane), and δ-isomers of BHC.

73-0128. Pilinskaya, M. A. (All-Union Research Inst. of Hygiene and Toxicology of Pesticides, Polymers and Plastics, Kiev, USSR). **Tsitogeneticheskoye deystviye fungitsida tsirama v kul'ture limfotsitov cheloveka *in vitro*. [Cytogenetic effects of the fungicide ziram on cultured human lymphocytes *in vitro*.]** *Genetika 7(5): 138-143; 1971.* (20 references) (Russian)

In vitro experiments on the cytogenetic effect of ziram at concentrations of 0.06, 0.015, 0.003, and 0.0006 μg/ml culture medium on cultured human lymphocytes are described. Statistically significant increases in the frequency of chromosomal aberrations were found at concentrations of 0.06, 0.015, and 0.003 μg/ml. The correlation coefficient between the concentration and the aberration frequency was 0.875. The ratio of chromatid-type to chromosome-type aberrations was 2.7:1 which suggests major chromosomal damage at the S and G2 stages of the mitotic cycle. Single acentric fragments prevailed in the chromatid aberrations, and paired acentric fragments with a few dicentric and annular chromosomes predominated in the chromosomal

aberrations. Ziram-induced chromosome breaks were found to be specific, most of them being limited to chromosome 2. The basic quantitative characteristics of the cytogenetic effect of ziram at 0.003 μg/ml were similar to those found in persons having occupational contact with this pesticide. Chromosomal damage in hemopoietic cells can be regarded as an essential element of the action mechanism of ziram.

73-0129. Brzheskiy, V. V. (All-Union Research Inst. of Disinfection and Sterilization, Moscow, USSR). **K voprosu ob izuchenii mutagennykh svoystv insektitsida iz gruppy karbamatov–Sevina. [Study of the mutagenic properties of Sevin (carbaryl).]** *Genetika 8(6): 151-153; 1972.* (5 references) (Russian)

D-32 and Meller-5 strain *Drosophila melanogaster* exposed to preparations containing 1% carbaryl by weight (~LD50) for 24 hours were examined for deletion of X-chromosomes, recessive sex-linked lethal and sublethal mutations in the F2 generation, and male fertility. While carbaryl caused no deletion or change in fertility, it produced partial and full lethal mutations in all stages of spermatogenesis with a cumulative frequency of 0.20 ± 0.07%. Spermatocytes were most sensitive to carbaryl. Partial mutations accounted for more than 50% of all mutations. The results suggest that carbaryl has a slight mutagenic tendency and that its mutagenic characteristics are different from those of ionizing radiation and other chemical mutagens.

73-0130. Vrochinskiy, K. K.; Danilenko, L. P. (All-Union Res. Inst. of Hyg. and Toxicol. of Pestic., Polymers, and Plastics, Kiev, USSR). **Toxicological characteristics of phthalophos and its permissible level in water bodies.** *Hyg. Sanit. 35(12): 414-416; 1970.* (1 reference)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 35(12): 94-96; 1970, see Abstract no. 71-2702.

73-0131. Vekshteyn, M. S.; Khitsenko, I. I. (All-Union Res. Inst. Hyg. and Toxicol. of Pestic., Polymers, and Plastics, Kiev, USSR). **Ziram metabolism in warm-blooded animals.** *Hyg. Sanit. 36(1): 28-33; 1971.* (8 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 36(1): 23-27; 1971, see Abstract no. 71-2703.

73-0132. Gofmekler, V. A.; Khuryev, B. B. (A. N. Sysin Inst. Gen. and Environ. Hyg., Acad. Med. Sci., Moscow, USSR). **Experimental study of the embryotropic effect of methylmercaptophos on inhalation.** *Hyg. Sanit. 36(1): 34-39; 1971.* (9 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 36(1): 27-32; 1971, see Abstract no. 71-2704.

73-0133. Elizarova, O. N.; Nuzhdina, D. P. (F. F. Erisman Res. Inst. of Hyg., Moscow, USSR). **Application of tissue cultures for determining the toxicity of pesticides.** *Hyg. Sanit. 36(1): 101-105; 1971.* (9 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 36(1): 83-87; 1971, see Abstract no. 71-2705.

73-0134. Medved', I. L.; Ivanova, Z. V. (Kiev Occup. Health Res. Inst., Kiev, USSR). **Hygienic evaluation of working conditions in the use of eptam (EPTC) in agriculture.** *Hyg. Sanit. 36(2): 196-199; 1971.* (4 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 36(2): 29-32; 1971, see Abstract no. 71-2706.

73-0135. Tarkov, M. I.; Merenyuk, G. V.; Timchenko, L. A. (Moldavian Res. Inst. Hyg. and Epidemiol., Kishinev, USSR). **Effect of dinitro-*o*-cresol (DNOC) on certain saprophytic and pathogenic microorganisms.** *Hyg. Sanit. 36(3): 392-395; 1971.* (6 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 36(3): 57-60; 1971, see Abstract no. 72-0824.

73-0136. Olefir, A. I. (Kiev Occup. Health Res. Inst., Kiev, USSR). **Effect of dipterex (trichlorfon) on the immunological reactivity of experimental animals.** *Hyg. Sanit. 36(3): 453-455; 1971.* (7 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 36(3): 104-105; 1971, see Abstract no. 72-0825.

73-0137. Belov, L. G. (Saratov Res. Inst. of Rural Hyg., Saratov, USSR). **On the toxicological and hygienic evaluation of the herbicide 4-amino-3,5,6-trichloropicolinic acid (Tordon-22K, picloram).** *Hyg. Sanit. 36(3): 466-469; 1971.*

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 36(3): 112; 1971, see Abstract no. 72-0826.

73-0138. Gupta, P. K.; Paul, B. S. (Coll. of Vet. Med., Punjab Agr. Univ., Ludhiana, India). **Effect of malathion on blood cholinesterase and its toxicity in *Gallus domesticus*.** *Indian J. Exp. Biol. 9(4): 455-457; 1971.* (11 references)

Malathion was orally administered to desi birds (*Gallus domesticus*) to determine the acute toxicity and effects on the blood cholinesterase. Fifty birds, five

groups of ten, received 200, 400, 600, and 800 mg/kg body weight. No mortalities occurred at doses of 200 mg/kg; the rates increased with the dosages. The maximum number of birds died 4-8 hr after treatment. The LD50 was 524.8 mg/kg body weight and the birds which died showed no gross pathological changes except little blood engorgement of the right and left ventricles. The erythrocyte cholinesterase level showed a dose dependent inhibition. The serum cholinesterase level initially increased with the lower dosages of 200 and 400mg/kg, but was then decreased following a dose dependent inhibition. Maximum inhibition occurred in serum and erythrocyte cholinesterase levels (50 and 67% respectively) during the first 12 to 48 hr.

73-0139. Venkataraman, G. S; Rajyalakshmi, B. (Div. of Microbiol., Indian Agr. Res. Inst., New Delhi 12, India). **Interactions between pesticides and soil microorganisms.** *Indian J. Exp. Biol. 9(4): 521-522; 1971.* (10 references)

Two commercial fungicides (ceresan M (granosan) and dithane (nabam)) and six herbicides (2,4-D, dalapon, propazine, cotoron (fluometuron), linuron, and diuron) were each mixed with 20 g air-dried, well-sieved alluvial soil and 1 g glucose to determine the effect of these pesticides on the microbial population of soil. The soil samples were incubated at 30°C±1° for 30 days and samples withdrawn at intervals of five days for microbial analyses. The tolerance of fungi *(Aspergillus* spp.) to different pesticides was examined by agar cup-method, and that of strains of *Azotobacter chroococcum* by streak method. The total counts of bacteria, fungi, and actinomycetes were made on Thornton, Martin's rose-bengal, and Kennight agar respectively. The bacterial and actinomycete populations were significantly suppressed by all the pesticides; most species of *Aspergillus,* the dominant constituents of the fungal flora in the study, seemed to be resistant to high concentrations of the pesticides. *Azotobacter chroococcum* exhibited considerable strain variation in its tolerance to different pesticides.

73-0140. Yu. C.; Metcalf, R. L.; Booth, G. M.* (Dept. of Entomol., Univ. of Illinois at Urbana-Champaign, Urbana, IL 61801). **Inhibition of acetylcholinesterase from mammals and insects by carbofuran and its related compounds and their toxicities toward these animals.** *J. Agr. Food Chem. 20(5): 923-926; 1972.* (16 references)

Carbofuran or 2,3-dihydro-2,2-dimethylbenzofuranyl-7 *N*-methylcarbamate and closely related analogs were studied for selective toxicity to mammals vs. insects and for details of their inhibition of acetylcholinesterases from bovine erythrocyte and housefly and honeybee brains. Main kinetic analysis of the inhibitory process showed that the binding energy for all these cholinesterases was increased by mono- and dimethylation of 2,3-dihydrobenzofuranyl-7-*N*-methylcarbamate. However, effects of carbamylation were not uniform. The toxicity values for the compounds to rat or mouse and for housefly or *Culex* mosquito larva were well correlated with the bimolecular rate constants for the inhibition of erythrocyte and housefly AChE. (Author abstract reprinted by permission of the American Chemical Society)

73-0141. Pellegrini, G.; Santi, R. (Direzione Generale Ricerche e Brevetti, Istituto di Ricerche Agrarie, Montecatini Edison S.p.A., Milan, Italy). **Potentiation of toxicity of organophosphorus compounds containing carboxylic ester functions towards warm-blooded animals by some organophosphorus impurities.** *J. Agr. Food Chem. 20(5): 944-950; 1972.* (17 references)

Evidence is presented of the potentiating effects exhibited by some organophosphorus impurities, which are normally present in technical organophosphorus pesticides, on the toxicity of the active ingredients to warm-blooded animals. These impurities were quantitatively determined by thin-layer chromatographic and gas chromatographic methods, and identified by mass spectral techniques. The varying and significant potentiating effects of oral toxicity to the rat were experimentally demonstrated for phenthoate, malathion, and *O,O*-dimethyl *S*-α-isopropoxycarbonybenzylphosphorodithioate (experimental product). Tests performed on phenthoate demonstrated that the organophosphorus impurities in no way affected the toxicity of this product to heterothermic animals (fish, insects, and mites). A simple chemical method of detoxification was also devised and developed, based on the addition of acetyl bromide to the above-mentioned technical products. Regarding phenthoate, experimental evidence indicates that, compared with the technical product, the detoxified product is less toxic not only to the rat but also to other warm-blooded animals. (Author abstract reprinted by permission of the American Chemical Society)

73-0142. Sullivan, L. J.; Eldridge, J. M.; Knaak, J. B.; Tallant, M. J. (Carnegie-Mellon Univ., Mellon Inst., Pittsburgh, PA 15213). **5,6-Dihydro-5,6-dihydroxycarbaryl glucuronide as a significant metabolite of carbaryl in the rat.** *J. Agr. Food Chem. 20(5): 980-985; 1972.* (9 references)

Further studies of the metabolism of carbaryl in the rat at 30 mg per kg body weight in a single oral dose have qualitatively reproduced the chromatographic profiles from urines of rats obtained by Knaak et al. (1965) on diethylaminoethyl cellulose columns after single oral and intraperitoneal dose studies. An attempt to verify the structure of a metabolite suspected of being 1-naphthyl methylimidocarbonate *O*-glucuronide (Knaak et al., 1965) has failed to confirm the hypothesis. The principal aglycone isolated from the ether-extractable fraction of an enzyme hydrolysate of this metabolite has been identified as 5,6-dihydro-5,6-dihydroxycarbaryl. When losses and unhydrolyzed glucuronide are propor-

tioned between this aglycone and others isolated, 10.5% of the dose is excreted as the 5,6-dihydro-5,6-dihydroxy-carbaryl glucuronide calculated as carbaryl equivalents. (Author abstract reprinted by permission of the American Chemical Society)

73-0143. Sherman, M. ; Herrick, R. R. (Coll. of Tropical Agr., Univ. of Hawaii, Honolulu, HI 96822). **Fly control, chronic toxicity, and residues from feeding 2-chloro-1-(2,4-dichlorophenyl)vinyl diethyl phosphate to hens.** *J. Agr. Food Chem. 20(5): 985-990; 1972.* (16 references)

Technical grade Compound 4072 [2-chloro-1(2,4-dichlorophenyl)vinyl diethylphosphate] was administered in the feed of laying hens for 52 weeks at 50 and 200 ppm. Excellent control of the housefly, *Musca domestica* L., and the blowfly, *Chrysomya megacephala* (F)., was obtained in droppings from the hens fed 50 ppm. No hen mortality occurred due to treatment, but blood plasma cholinesterase activity was inhibited. Feed consumption, weight gain, shell thickness, egg weight, egg flavor, and odor were normal, but treatment affected egg production. GLC methods were developed to measure nanogram amounts of Compound 4072 and 2,2′,4′-trichloroacetophenone by phosphorus and electron capture detection, respectively. The limits of detectability in the various tissues ranged from 0.002 to 0.020 ppm for Compound 4072 and from 0.002 to 0.009 ppm for 2,2′,4′-trichloroacetophenone. No residues of Compound 4072 were detected, but low levels of 2,2′,4′-trichloroacetophenone were found in liver, fat, and egg yolk. (Author abstract reprinted by permission of the American Chemical Society)

73-0144. Gutenmann, W. H.; Serum, J. W.; Lisk, D. J.* (Pestic. Residue Lab., Dept. of Entomol., Cornell Univ., Ithaca, NY 14850). **Feeding studies with VCS-438 herbicide in the dairy cow.** *J. Agr. Food Chem. 20(5): 991-993; 1972.* (3 references)

The herbicide VCS-438 [2-(3,4-dichlorophenyl)-4-methyl-1,2,4-oxadiazolidine-3,5-dione] was fed to a lactating cow. Residues were not detected in milk, urine, or feces when 5 ppm were fed in the cattle ration. The compound was stable when incubated with the 10,000 X *g* supernatant fraction of beef liver. In rumen fluid VCS-438 decomposed with production of a metabolite having an *Rf* value by thin-layer chromatography equal to that of 1-(3,4-dichlorophenyl)-3-methylurea. Mass spectrometric analysis also indicated the latter compound as the possible metabolite. (Author abstract reprinted by permission of the American Chemical Society)

73-0145. Bhatia, S. C .; Venkitasubramanian, T. A. (Dept. of Biochem., Vallabhbhai Patel Chest Inst., Univ. of Delhi, Delhi-7, India). **Mechanism of dieldrin-induced fat accumulation in rat liver.** *J. Agr. Food Chem. 20(5): 993-996; 1972.* (31 references)

Dieldrin was administered orally to male albino rats at a dose level of 30 mg/kg and the effects on hepatic lipid metabolism were determined. Liver total lipid content was increased ($p < 0.05$) and this change was confined only to the triglyceride fraction; phospholipid and cholesterol levels remained unaltered. This was paralleled by an increase in incorporation of glucose-^{14}C into glyceride-glycerol. The incorporation of the isotope into fatty acids and the activity of hepatic fatty acid synthetase were significantly reduced in insecticide-administered rats, indicating an inhibition of lipogenesis by dieldrin. The secretion of triglycerides into plasma is unaffected. Hence, the accumulation of fat in the liver during dieldrin toxicity is ascribed to enhanced hepatic synthesis of triglycerides due to increased availability of free fatty acids and α-glycerophosphate. (Author abstract reprinted by permission of the American Chemical Society)

73-0146. Lamoureux, G. L. ; Stafford, L. E.; Shimabukuro, R. H. (Metabolism and Radiation Res. Lab., Agr. Res. Service, U. S. Dept. of Agr., Fargo, ND 58102). **Conjugation of 2-chloro-4,6-bis(alkylamino)-*s*-triazines in higher plants.** *J. Agr. Food Chem. 20(5): 1004-1010; 1972.* (13 references)

Atrazine and four closely related 2-chloro-*s*-triazines were rapidly metabolized to water-soluble compounds in the leaves of tolerant corn, sorghum, and sugarcane. The primary route of metabolism appeared to be the displacement of the 2-chloro group with glutathione or γ-glutamylcysteine. The resulting sulfide conjugates were among the most abundant water-soluble metabolites present six hr after treatment. The primary route of metabolism of the 2-chloro-*s*-triazines in susceptible barley was similar to that found in the tolerant species; however, the overall rate of metabolism in susceptible barley was much slower than in the tolerant species. (Author abstract reprinted by permission of the American Chemical Society)

73-0147. Sakai, M. (Takeda Chemical Industries, Ltd., Japan). **The chemistry and action of cartap.** *Jap. Pestic. Inform. 6: 15-19; 1971.*

Cartap is a recently developed insecticide modeled after the naturally occurring insecticidal substance, nereistoxin, isolated from the marine segmented worms, *Lumbrineris (Lumbriconereis) L. heteropoda*. The water soluble powder and dust, marketed as Padan since 1967, controls rice stem borer insects by damaging the nervous system. The toxicity of the compound to mammals is caused by its cholinergic blocking action. The oral LD50 of cartap-HCl is 250 mg/kg for fasted female and 165-224 mg/kg in fasted male mice. A dose equivalent to 1 g/kg as a 10% aqueous solution and maintained in

contact with shaved dorsal skin of male mice for seven days produced no toxic symptoms. One drop of 10% aqueous solution applied to a rabbit's conjuctival sac caused no irritation. The LC50 of cartap-HCl has been reported as 1.5 ppm for carp 48 hr after the treatment of water. Laboratory investigations have shown that the fish toxicity is residual only for a few days after the application of the usual dose of cartap-HCl into a rice paddy.

73-0148. Ishii, K. (Nippon Soda Co., Ltd., Japan). **Development of thiophanate (TOPSIN), thiophanate-methyl (TOPSIN-M).** *Jap. Pestic. Inform. 7: 27-31; 1971.*

Thiophanate (TOPSIN) and thiophanate-methyl (TOPSIN-M) are systemic fungicides which have been proven effective in the control of fungus diseases in several field trials in Japan. The mammalian LD50 is significantly lower for the thiophanate-methyl compound. No signs of skin irritation were observed on albino male rabbits with 1% suspensions of thiophanate or thiophanate-methyl in gum arabic aqueous solution. Subchronic toxicity studies for six months in mice and rats and studies on the teratogenic effects of these compounds showed no ill effects. Two-year dietary studies are currently in progress. Fish toxicity studies showed that the median tolerance limit for carp at 72 hr was greater than 20ppm for thiophanate and greater than 75 ppm for thiophanate-methyl.

73-0149. Gielen, J. E.; Nebert, D. W. (Lab. of Biomed. Sci., Nat. Inst. of Child Health and Human Develop., Nat. Inst. of Health, Bethesda, MD 20014). **Aryl hydrocarbon hydroxylase induction in mammalian liver cell culture. I. Stimulation of enzyme activity in nonhepatic cells and in hepatic cells by phenobarbital, polycyclic hydrocarbons, and 2,2-bis(*p*-chlorophenyl)-1,1,1-trichloroethane.** *J. Biol. Chem. 246(17): 5189-5198; 1971.* (73 references)

DDT, tested as an inducer of aryl hydroxylase in hepatic cell cultures, had an optimum inducing concentration of 100 μM compared with 2.0 mM for phenobarbital (PB), 0.75 M for 3-methylcholanthrene (MC), and 13 μM for benz(a)anthracene (BA). The amount of MC, BA, or p,p'-DDT not extracted from the growth medium was negligible. These findings suggest that structural specificity must be important in lipophilic inducers of oxidase activity. The lipid solubility and optimal inducing concentration of PB were proportional to those of DDT, indicating that induction by these two compounds may be less specific than that by polycyclic hydrocarbons. Induction of hydroxylase activity was approximately 2-fold by DDT alone and 8-fold by MC plus DDT. No additive effect was observed with a combination of PB and DDT.

73-0150. Yuhas, J. M. (Biol. Div., Oak Ridge Nat. Lab., TN 37830). **Improvement of lung tumor radiotherapy through differential chemoprotection of normal and tumor tissue.** *J. Nat. Cancer Inst. 48: 1255-1257; 1972.* (7 references)

Administration of WR-2721 (*S*-2-[3-aminopropylamino]ethylphosphorothioic acid) at 60% LD50 to mice, 15 min prior to exposure of tumorous lungs to ^{137}cesium γ-rays, doubled the radiation resistance of normal tissues exposed to the radiation. Within 60 days after exposure 2355±136 R were required to induce complete hair loss in 50% of the controls, whereas in WR-2721-treated animals the required exposure was 4877±236 R. Mortality was similarly affected. Treatment with WR-2721 did not affect the mean tumor volume/mouse or protect tumors against γ-ray exposure. Additional data being accumulated in the laboratory indicate that protection of normal tissue and lack of protection of tumors are independent of the number of weekly fractions given.

73-0151. Sidell, F. R.; Groff, W. A.; Kaminskis, A. (Clin. Res. Branch, Biomed. Lab., Edgewood Arsenal, MD 21010). **Pralidoxime methanesulfonate: plasma levels and pharmacokinetics after oral administration to man.** *J. Pharm. Sci. 61(7): 1136-1140; 1972.* (15 references)

Administration of up to 20 tablets (8 g) of a new oral formulation of pralidoxime methanesulfonate to human volunteers caused neither symptoms nor changes in heart rate or blood pressure. Plasma levels were approximately 50% of their maximum within 30 min. A therapeutic level (4μg/ml) was maintained from 20 min to 5 hr in subjects receiving 6 or 8 g, and from 45 min to 2.5 hr in subjects receiving 4 g. Fasting resulted in higher initial and lower subsequent levels, but differences were insignificant. Over half of the 31.9% of the dose which was excreted in the urine over a 24-hr period was found in the first 3 hr, and the percentage of dose excreted decreased with increasing dose. The renal clearance was 4.1 times that of exogenous creatine. The volume of distribution was larger than body volume, indicating that large quantities of drug must be concentrated in some tissue. Molar concentrations in plasma were similar to those obtained with a comparable dose of pralidoxime chloride.

73-0152. Shimada, J. (Chiba Prefect. Inst. of Pub. Health, Chiba, Japan). **[Toxicity of DDT to freshwater fish.]** *Kagaku to Seibutsu (Chem. Biol.) 10(9): 626-629; 1972.* (14 references) (Japanese)

Reports on the toxic effects of direct administration of DDT to freshwater fish are reviewed. DDT produces necrosis and epithelial erosion in the gastrointestinal tract of trout and guppy fry; death ensues, probably due to impairment of yolk adsorption. DDT is absorbed from the intestinal tract of adult fish and stored in the

body fat, which probably accounts for the lower toxicity of DDT in fat-rich fish species. Thus the increase in body fat observed in some species after DDT administration represents a protective response. In the liver DDT induces necrosis and cellular vacuolation and decreases the glycogen content. The latter is accompanied by a rise in blood sugar in DDT-injured fish; however, no increase in glucose-6-phosphate dehydrogenase was noted. DDT produces tubular necrosis and epithelial degeneration in the kidneys of salmon fry. Renal damage is indicated by a rise in free amino acid content of the serum due to defective amino acid utilization or to leakage from damaged tubules. Damage to adrenal and thyroid glands, spleen, and epidermis, the latter followed by secondary bacterial invasion, has also been recorded. The metabolic fate of DDT in invertebrates has not been fully elucidated.

73-0153. Okey, A. B. (Dept. of Biol., Univ. of Windsor, Windsor, Ontario, Canada). **Dimethylbenzanthracene-induced mammary tumors in rats: inhibition by DDT.** *Life Sci. 11(17): 833-843; 1972.* (40 references)

Pretreatment of female Sprague-Dawley rats with *p,p'*-DDT significantly reduces their subsequent liability to mammary tumor induction by dimethylbenzanthracene (DMBA). Tumorigenesis is inhibited by doses as low as 10 parts per million DDT in the diet; inhibition appears to be due to DDT's ability to stimulate hepatic metabolism of DMBA, thus reducing the dose of carcinogen reaching mammary tissue. (Author abstract by permission)

73-0154. Henriksson, K.; Kallela, K.; Virtamo, M.; Pfaffli, P. (State Vet. Med. Inst., Helsinki, Finland). **Vapona-liuskoista haihtuvan DDVP: n myrkyllisyys. [The toxicity of DDVP (dichlorvos) evaporated from Vapona Strip.]** *Maataloustieteellinen Aikak. 43(3): 187-200; 1971.* (15 references) (French)

The toxicity of dichlorvos (DDVP) evaporating from Vapona Strips was studied for three months in 6 calves, 1 heifer, 6 guinea pigs, 7 sheep, and 20 mice kept in an experimental stable of 140 m^3 and in the stable personnel. The initial DDVP concentration of 0.09-0.14 mg/m^3 (corresponding to the use of the recommended number of Vapona Strips) was gradually increased to 2.1 mg/m^3. The number of strips was multiplied by 2, 4, 6, 10, and 16 every week during the first half of the experiment; the concentration was reduced to the initial value by the end of the experiment. The temperature was kept at 21.7°C with relative humidities of 45-95%. The ventilation was kept as low as possible with high carbon monoxide and ammonia contents (11-43 ppm respectively) as a result. The DDVP content in the strips after three months of use was reduced by 30%. No symptoms of poisoning were observed in the animals or the personnel although the maximum concentration slightly irritated the mucosa of the personnel and caused momentary dyspnea in some calves. The weight gain of the calves was normal, and no DDVP was detected in the blood of the calves. The serum cholinesterase activity in calves and the personnel did not differ from the control values. Three mice bore normal litters during the experiment.

73-0155. Hoffman, D. L.; Mattox, V. R. (Mayo Clinic, Rochester, MN 55901). **Treatment of adrenocortical carcinoma with *o,p'*-DDD.** *Med. Clin. N. Amer. 56(4): 999-1012; 1972.* (17 references)

The use of *o,p'*-DDD(TDE) for treatment of adrenocortical carcinoma was not as effective as has been reported elsewhere. Of the 19 patients treated at the Mayo Clinic between 1959 and 1971, only four had tumor regression, and two others without proven tumor regression had a remission of clinical symptoms. One of those experienced a remission of severe Cushing's manifestations for 5 1/2 yr after six mo of treatment and then for 1 1/2 yr with continuous treatment. The second had no hyperaldosteronism for 14 mo although his tumor continued to grow. The drug dosage was increased gradually over a week's time to 10 g/day, unless toxicity prevented it, and then reduced after a favorable tumor or steroid response to the maximum dosage tolerated without uncomfortable side-effects. Maintenance doses were administered for periods from 5 wk to 19 mo. There appears to be no way of predicting who will respond well to treatment; those in whom steroid excretion is controlled have a much greater chance for tumor response. Toxicity was the major deterrent in the use of *o,p'*-DDD in this study. The majority of patients suffered general lassitude, gloom, and apathy, which ranged from mild dulling of interest to profound psychotic depression. Fatigue, somnolence, lethargy, anorexia, nausea, vomiting, and diarrhea were common complaints.

73-0156. Norkowski, S.; Kossakowski, S. (Sci. Res. Cent. of the Vet. Service, Pulawy, Poland). **Badania nad skutecznoscia PAM-u i siarczanu atropiny w leczeniu zatruc zwierzat Foschlorem. [Studies on the effectiveness of treatment with PAM and atropine sulfate on animals poisoned with Foschlor].** *Med. Wet. 27(10): 617-619; 1971.* (22 references) (Polish)

Three groups of rabbits (8 each, random bred, 3 kg body weight) were injected with Foschlor (trichlorfon) (i.m., 400 mg/kg). As soon as symptoms of intoxication appeared, group II received 15 mg/kg PAM (i.m.) and 0.5 mg/kg atropine (s.c.); group III received 30 mg/kg PAM and 0.5 mg/kg atropine respectively; group I served as control. Blood cholinesterase (ChE) activity was determined after ½, 1, 2, 24, 48, 72 hours and after 10 days. Severe symptoms of intoxication appeared in all animals 27 minutes after poisoning; all animals of group I died within 1-2 hours. ChE activity decreased 53.7%

after 30 minutes and 55.4% after 60 minutes. All treated animals survived: in group II symptoms disappeared within 24 hr but ChE normalization was slow, reaching a low point of 38.2% after 48 hours and slowly increasing to 95.4% of original after 10 days. In group III symptoms of intoxication disappeared faster than in group II and activity of ChE reached 97.1% after 10 days.

73-0157. Anonymous. **No herbicide residues found in lamb or beef, says ARS.** *Nat. Wool Grower 62(7): 26; 1972.*

Cattle and sheep were fed dietary levels of 300, 1,000, and 2,000 ppm of silvex, 2,4-D, and 2,4,5-T, which simulated normal treated range conditions and ranges to which herbicides had been applied very carelessly. Results after 28 days indicate that herbicide residues in meat are not a problem, particularly since there is generally a finishing period before slaughter during which there is no exposure to pesticides. Cattle fed 2,000 ppm silvex and monitored 24 hr after the last dose had residues of 1.0 ppm in muscle, 3.8 ppm in fat, 8.4 ppm in liver, and 24.0 ppm in kidney. Seven days after the last dose, residues were reduced at least 10 fold in all tissues. Only trace amounts of residue were found in tissue of sheep fed 2,4,5-T and slaughtered after seven days. Less than 1 ppm 2,4-D was found in all tissues of cattle and sheep fed at a level of 2,000 ppm and slaughtered within 24 hr.

73-0158. Nishiuchi, K. (Agr. Chem. Insp. Sta., Min. of Agr. and Forestry, Tokyo, Japan). **[Effects of pesticides on fresh-water gastropods].** *Noyaku Seisan Gijutsu (Pestic. Tech.) 28: 9; 1972.* (Japanese)

Due to recent interest in the cultivation of edible pond snails in fallow rice paddies, it was considered worthwhile to study the effects of pesticides on four species of fresh-water gastropods: *Indoplanorbis exustus, Semisulcospira libertina, Cipangopaludina malleata,* and *Physa acuta*. Test conditions were similar to those used in determining the LC50 in fish; the test temperature was 22°C. The trend of susceptibility to the 108 pesticides tested was generally the same among the four snail species, but the susceptibility patterns differed from those in the carp. Gastropods were generally less sensitive to the pesticides than carp. LC50 (48 hr) values of the most toxic compounds to *Indoplanorbis* are as follows; trichlorofon 1.8 ppm; salithion, 2.0 ppm; karathane, 2.7 ppm; various copper compounds, ca. 1 ppm; ziram, 0.06 ppm; and sodium pentachlorophenolate, 0.62 ppm. Some substances, such as trichlorfon, cause abnormal protrusion of gastropod body parts after exposure to concentrations far below the LC50, e.g., 0.03 ppm trichlorfon. Once such a protrusion has occurred, the snails die in 3-4 days after transfer to fresh water.

73-0159. Morikawa, O.; Tamagawa, S.; Iriai, T.; Funakoshi, Y.; Oyamada, M.; Tan, K. (Agr. Chem. Res. Lab., Mitsui-Toatsu Chem. Ind. Co. Ltd., Japan). **[Fate of Select (2-amino-(*N*-propionyl)-4-methyl-5-chlorothiazole) residues in soil.]** *Noyaku Seisan Gijutsu (Pestic. Tech.) 28: 36-37; 1972.* (Japanese)

Select (naptalam) is a contact herbicide used in alternating row barley and rye fields. Select in soil is primarily degraded by soil microorganisms. When Select-treated, sterilized soil at 60% moisture capacity was incubated at 30°C, no decomposition of the herbicide occurred whereas without prior soil sterilization, the half-life of Select was less than two days. When unsterilized soil was extracted after five days of incubation with 500 ppm of ^{14}C-Select and the extract examined by thin-layer chromatography, 9 or 10 metabolites of Select were found. The main metabolite was 2-amino-4-methyl-5-chlorothiazole and two dechlorinated metabolites were also identified. Further degradation proceeds by way of thiourea. The maximum concentration of the main metabolite in the soil was reached on the second day of incubation. CPMT residue levels in wheat at harvest were below the gas chromatographic detection level despite the application of 3.4 kg/heacare.

73-0160. Phillips, W. E. J.; Hatina, G. (Health Protect. Branch, Dept. of Nat. Health and Welfare, Ottawa, Canada). **Effect of dietary organochlorine pesticides on the liver vitamin A content of the weanling rat.** *Nutr. Rep. Int. 5(5): 357-362; 1972.* (12 references)

DDT ingestion is known to reduce liver storage of vitamin A in rats and cattle. A study was conducted to compare the effects of DDT with five other organochlorine pesticides: chlordane, lindane, toxaphene, methoxychlor, and dieldrin. Seventy-two female Wistar rats divided into eight groups were raised from weaning to sexual maturity (100 days of age) on 23% protein diets containing 100 ppm of the above pesticides except dieldrin, which had a reduced concentration of 10 ppm after 16 days. The rats were then bred and the vitamin A status of the dams and progeny determined. Only dieldrin reduced the liver vitamin A of the parent stock. The vitamin A content of the livers of the progeny from dams fed DDT decreased approximately 10%. The other organochlorine treatments reduced liver vitamin A of the progeny similar to DDT, except dieldrin which caused a 27% reduction. The actual rates of ingestion of the pesticides were approximately 5 mg/kg body weight/day except for dieldrin; these rates are extremely high in relation to actual ingestion by man.

73-0161. Cordelier, C.; Casanova, A. (Departement Elanco, Societe Eli Lilly France S. A., Paris, France). **Triarimol: ses principales proprietes physiocochimiques et biologiques. [Triarimol: its basic physicochemical and biological properties.]** *Phytiat.-Phytopharm. 20(2): 75-86; 1971.* (8 references) (French)

Physicochemical, toxicological, and biological properties of the fungicide triarimol (EL 273) are de-

scribed. Even in very low concentrations triarimol is effective against parasitic fungi. Triarimol is absorbed rapidly by plants and shows no preferential accumulation in plant parts. Investigations revealed maximum residue concentrations of 0.1 ppm in plant parts intended for human consumption. Triarimol has a low toxicity to animals; the oral LD50 value is 675 mg/kg for rats in acute poisoning and 500 mg/kg or greater in dogs, cats, and chickens. The maximum ineffective daily intake for chronic poisoning was 800 and 400 ppm, respectively, in dogs and rats. Although rats developed temporary liver dysfunction, the metabolites of triarimol were eliminated from the organism within 72 hours. The LC50 for minnow was 2.5 ppm, and triarimol added to fishpond water at a rate of 250 g/ha had no effect on minnows. No damages to bees exposed to apple-tree leaves which were previously treated with triarimol were observed. Triarimol in 10%-suspension had irritating effects on rabbit skin while no irritations of the eye occurred due to 0.1 ml of 5% suspension.

73-0162. Tanaka, F. S.; Swanson, H. R.; Frear, D. S. (Plant Sci. Res. Div. Agr. Res. Service, U.S. Dept. of Agr., Metabolism and Radiation Res. Lab., State Univ. Station, Fargo, ND 58102). **An unstable hydroxymethyl intermediate formed in the metabolism of 3-(4-chlorophenyl)-1-methylurea in cotton.** *Phytochemistry 11(9): 2701-2708; 1972.* (8 references)

During TLC of demethylation products of 3-(4-chlorophenyl)-1-methylurea by cotton microsomes, an unstable metabolite was observed; formaldehyde and 4-chlorophenylurea were its decomposition products. A stable derivative characterized by isotope dilution analysis as 3-(4-chlorophenyl)-1-methoxymethylurea was formed in MeOH. The same derivative had been obtained in MeOH from a glucoside conjugate isolated from the metabolism of the same substrate in excised cotton leaves. The unstable metabolite was identified as 3-(4-chlorophenyl)-1-hydroxymethylurea.

73-0163. Tanaka, F. S.; Swanson, H. R.; Frear, D. S. (Plant Sci. Res. Div., Agr. Res. Service, U.S. Dept. of Agr., Metabolism and Radiation Res. Lab., State Univ. Station, Fargo, ND 58102). **Mechanism of oxidative *N*-demethylation by cotton microsomes.** *Phytochemistry 11(9): 2709-2715; 1972.* (24 references)

To elucidate the mechanism of microsomal *N*-demethylation of substituted 3-(phenyl)-1-methylureas, inhibition studies using cotton microsomes were carried out with *N*-methylcarbamates and phenylureas. Effective carbamate inhibitors had a high electron density at the *ortho* position to the carbamate group. A strong electron withdrawing group in the *meta* position prevented inhibition of the reaction while a strong electron donating group in the *meta* position enhanced it. With several substituted phenylureas the proton on the aniline nitrogen atom was necessary for effective inhibition of the microsomal *N*-demethylase system. Stable isotope studies with a methyl-d_3 labeled 3-(phenyl)-1-methylurea indicated a secondary isotopic effect. Isotopic exchange did not occur when the ^{18}O label was used.

73-0164. Gray, L. E.; Sinclair, J. B. (Univ. of Illinois, Urbana, IL 61801). **Systemic uptake of ^{14}C-labeled 2-(4′-thiazolyl)benzimidazole in soybean.** *Phytopathology 61(5): 523-525; 1971.* (9 references)

Uptake and translocation of TBZ (thiabendazole) in soybean was demonstrated using ^{14}C-labeled TBZ and nonlabeled TBZ. After three days' exposure to 0.94μc of ^{14}C-TBZ and four days in distilled water, cpm/g of tissue X 10^4 were: root, 13.0; hypocotyl, 0.83; cotyledon, 3.3; and epicotyl, 3.5. After seven days' exposure, the corresponding cpm were: root, 28.0; hypocotyl, 0.97; cotyledon, 1.4; and epicotyl, 8.4. In radioautographs of plants exposed for seven days all soybean tissues contained ^{14}C-TBZ. No breakdown products were detected on TLC plates spotted with extracts of plants treated with labeled material. Bioassays of bands from TLC plates spotted with extracts from plants exposed to nonlabeled material revealed only one active zone. TBZ was fungitoxic to *Cephalosporium gregatum* both *in vitro* and *in vivo*.

73-0165. Siegel, M. R.; Zabbia, Jr., A. J. (Dept. of Plant Pathol. Univ. of Kentucky, Lexington, KY 40506). **Distribution and metabolic fate of the fungicide benomyl in dwarf pea.** *Phytopathology 62(6): 630-633; 1972. (22 references)*

Dwarf pea plannts (*Pisum sativum*) growing in nutrient solutions were root-treated with ^{14}C benomyl for four days, then harvested 4-52 days after treatment to determine the distribution and metabolic fate of the fungicide. No ^{14}C benomyl was recovered from the plants at any time. However, a fungitoxic derivative, ^{14}C methyl 2-benzimidazolecarbamate (MBC), was present in large quantities in organic solvent extracts from treated plants. Fifty-two days after treatment, at senescence, 78% of the label was present in MBC, 5% in water soluble metabolites, and 14% bound to the plant residue. Treatment of residue with hot NaOH solution released 50% of the bound label, a portion of which was present in 2-aminobenzimidazole. Translocation of the labeled products from the roots to the foliage of the plant occurred rapidly; 52 days after treatment 92% of the label was in nonroot portions and concentrated primarily in the foliage. The accumulation of radioactivity in the seeds was extremely low even when the plant roots were continuously exposed to the labeled fungicide. The data suggest that long-term chemotherapeutic effects of MBC will depend on the mode of application, distribution, and concentration of the fungicide in plants.

73-0166. Feung, C.-S.; Hamilton, R. H.; Witham, F. H.; Mumma, R. O. (Dept. of Biol., Pennsylvania State Univ., University Park, PA 16802). **The relative amounts and identification of some 2,4-dichlorophenoxyacetic acid metabolites isolated from soybean cotyledon callus cultures.** *Plant Physiol. 50(1): 80-86; 1972.* (13 references)

Soybean cotyledon callus grown on a complete medium using 2,4-D-1-^{14}C as the auxin took up approx. 93% of the total herbicide in the medium by the 32nd day, indicating little decarboxylation in this tissue. A steady increase in water soluble metabolites was observed over 24 days. Treatment of water soluble fractions, taken after eight days' incubation, with β-glucosidase revealed at least eight aglycones. The most abundant aglycone at all time points was 4-hydroxy-2,5-dichlorophenoxyacetic acid. Ether soluble radioactivity, found to be divided amoung unmetabolized 2,4-D and six metabolites, reached a maximum of 82% of the total in two days. The most abundant ether soluble metabolite after longer periods was 2,4-D aspartic acid, which was characterized in detail by MS analysis.

73-0167. Rump, S. (Pharmacol. Res. Inst. of Acad. of Med., Warsaw, Poland). **Wplyw zwiazkow antycholinoesterazowych na przekaznictwo nerwowo-miesniowe. [The influence of anticholinesterase compounds on neuromuscular transmission.]** *Postepy Hig. Med. Dosw. 26: 225-249; 1972.* (138 references) (Polish)

A detailed review and discussion is presented emphasizing the activity of neostigmine, sarin, soman, DFP, and antagonists such as succinylcholine and decamethonium. A great diversity in the mechanism of action is stressed: some compounds, in addition to inhibiting AChE, also have a direct effect on the presynaptic ending; others affect the receptor directly. The mechanism of eliciting different types of contraction and post-tetanic inhibition in relation to dose of compound is discussed. The mechanism of action of organophorphorus compounds is not clear since they seem to affect ChE, the receptor itself, and also have a direct action on the denervated muscle. Inhibition of neuromuscular transmission by DFP is related to pre-synaptic structure, but a direct reaction with the post-synaptic receptor also occurs. It is concluded that with soman the AChE inactivating mechanism plays a more important role than in the case with sarin and neostigmine which act mainly on the post-synaptic receptor.

73-0168. Epler, P. (Inst. of Applied Zool., Krakow, Poland). **Oddzialywanie zanieczyszczenia wod na ich ichtiofaune. III. Toksycznosc pestycydow i detergentow. [The effect of polluted water on its ichthyofauna. III. Toxicity of pesticides and detergents.]** *Postepy Nauk: Roln. 5: 61-82; 1971.* (42 references) (Polish)

A detailed review is given on the effect of a number of pesticides, herbicides, fungicides, and surface active agents (singly and in combination) on a variety of fishes, especially trout and salmon. The relationship of concentration, depth, duration of exposure to LD50 and amount of residue in different organs and tissues is discussed. It is stressed that differing pesticide resistance of fish can lead to a change in the population equilibrium and elimination of desirable species from certain waters. Resistance of some fish to the toxic action of pesticides also leads to excessive accumulation of residues in tissues which may ultimately pass on to man. The relationship between concentration of detergents and amount of dissolved oxygen on fish survival is also reviewed.

73-0169. Krampl, V.; Grigel, M. (Vyskumny ustav hygieny prace a chorob z povolania, Bratislava, Czechoslovakia). **Vztah serovych enzymov k morfologickym zmenam v peceni potkanov po aplikacii chlorovanych cyklodienovych insekticidov. [Relationships between serum enzymes and morphological changes occurring in the rat liver after administration of chlorinated cyclodiene insecticides.]** *Prac. Lek. 24(4): 121-125; 1972.* (13 references) (Slovak)

Two hours after acute treatment of female Wistar rats with aldrin or dieldrin (40 mg/kg p.o. single dose), liver glutamic pyruvic transaminase and aldolase activities increased. Seventy-two hours after treatment, liver activity levels decreased to below normal while the serum levels peaked. A four week daily administration of 7 or 12 mg/kg of the compounds reduced the liver enzyme activities to a minimum after seven days; the levels remained below normal. Once again low levels of liver activities coincided with peak levels of serum. Reversible morphological alterations of the liver, including cell vacuolation and nuclear pyknosis, were most severe at the time of maximum serum enzyme levels, which were probably associated with an increased hepatocellular membrane permeability occurring in the damaged liver. The reversible nature of the alterations indicates that an adaptation to the toxic compound had occurred after four weeks of continuous administration. Serum GPT and aldolase are suggested as useful parameters in the evaluation of acute and subacute toxicity of chlorinated cyclodiene insecticides.

73-0170. Ostroumov, S. A. (Author address not given). **DDT vliyayet na bioenergetiku kletki. [The effects of DDT on cellular bioenergetics.]** *Priroda (Moscow) 2: 108; 1972.* (3 references) (Russian)

Results of cytological studies on the bioenergetical effects of DDT and DDE are reviewed. Damages of the energy supply systems of animal and vegetal cells due to DDT were determined. Inhibition of the adenosine triphosphate synthesis and of the oxidation of Krebs cycle intermediate acids by DDT were observed in subcellular preparations from *Musca domestica.* DDT also inhibited one of the adenosine triphosphatases in rat brain. Both

DDT and DDE inhibited the photosynthesis, observed in chloroplasts of spinach, barley, and the green algae, *Codium fragile* and *Chaetomorpha aerea*, presumably due to the inhibition of the electron transport of the oxidative-regenerative carriers of the chloroplast. The considerable reduction in the assimilation of carbon dioxide by phytoplankton caused by small DDT concentrations in the water also may be linked to the inhibition of the electron transport. The DDT and DDE concentration causing 50% reduction in the electron transport was 0.00002 *M*.

73-0171. Bergen, W. G. (Pestic. Res. Lab., Dept. of Animal Husbandry, Michigan State Univ., East Lansing, MI 48823). **Liver and brain nucleic acids and body composition of growing rats fed dieldrin.** *Proc. Soc. Exp. Biol. Med. 140(4): 1259-1262; 1972.* (14 references)

Dieldrin, fed at 1 and 5 ppm to growing rats had no effect on body fat and protein concentrations, growth rates, and liver and brain weights after 2 or 4 wk. After 2 wk liver RNA and DNA levels were elevated in rats fed either dose, but declined almost to weanling levels after 4 wk. Increases probably were associated with production of drug metabolizing enzymes. Brain RNA was significantly elevated after 2 and 4 wk feeding periods, and an increase in DNA was observed after 4 wk. The results suggest that overall liver and brain development in young growing rats is not affected by dieldrin at low levels since interference in organ development is indicated by decline in nucleic acids.

73-0172. Larini, L.; Saad, W. A,; Camargo, L. A. A.; Yasaka, W. J. (Cadeira de Bromatologia e Toxicol., Fac. de Farmacia e Odontologia, Araraquara, Brazil). **Toxicidade aguda do fungicida *O,O*-diisopropil-*S*-benziltiofosfato (Kitazin-P). [Acute toxicity of *O,O*-diisrpropyl-*S*-benzilthiophosphate (Kitazin-P).]** *Rev. Fac. Farm. Odontol. Araraquara 4(2): 279-284; 1970* (9 references) (Portuguese)

Acute toxicity studies were performed on albino Holtzman male rats given *O,O*-diisoopropyl-*S*-benzylthiophosphate (Kitazin P.). The doses of 500-1000 mg/kg at 100 mg/kg intervals p.o. showed the LD50 as 739.0 mg/kg. Topical application on a shaved portion of the dorso-caudal region of female rats revealed a dermal LD50 of 2,051.5 mg/kg. As compared to other organophosphates, Kitazin-P is a low toxicity product.

73-0173. Godfrain, J.-C.; Rico, A. G.; Lorgue, G.; Burgat, V.; Sy, M.; Maillet, M.; Megemont, Ch.; Felix, C.; Borrel, A.; Dumas, G. (Pharmacie et Toxicologie, Ecole Nationale Veterinaire, Toulouse, France). **Contribution a l'etude, a l'aide de phosphore radioactif, du metabolisme de l'Hexametapol ^{32}P (H.M.P.T.) chez les ovins et les bovins. [A contribution to the study of the metabolism of Hexametapol ^{32}P (hempa) in cattle and sheep with the help of radioactive phosphorus.]** *Rev. Med. Vet. 122(4): 371-390; 1971.* (French)

The absorption, elimination, and metabolism of ^{32}P-labeled Hexametapol (hexamethylphosphoric triamide) were investigated in sheep and cattle. The absorption in both sheep and cattle was very rapid and practically complete 24 hours after subcutaneous administration. The maximum concentration in sheep blood was found 2-4 hr after administration. Very rapid elimination (70% after 24, and 94% after 48 hr) was observed and the rest hydrolyzed to inorganic phosphate. Though hempa showed no preferential accumulation in the tissues of sheep, the relatively high contents in the bile and liver, and very low concentrations in the intestinal contents suggest enterohepatic cycle of hempa. The residue contents were negligible in muscles and the intestines of sheep and cows after 144 hr. The absorption in cows was very rapid and nearly total within 24 hr. The elimination occurred almost exclusively with milk in which the concentration was highest 9 hr after administration. The elimination was practically complete within 60 hr. The distribution was less regular in cows than in sheep. Residues were detected in the skin, bile, liver, kidney, heart, cerebrum, and muscle.

73-0174. Lorgue, G.; Delatour, P.; Dalloz, J. P. (Author address not given). **Le metaldehyde. [Metaldehyde.]** *Rev. Med. Vet. 123(3): 442; 1972.* (French)

The toxicology and symptomatology of metaldehyde, a molluscicide, are reviewed. Metaldehyde, a convulsant, excites the central nervous system. The maximum allowable dose in man is 250 mg/kg, and the oral LD50 value for dog and guinea pig are 500 mg/kg while that of rabbit is 1,250 mg/kg. Metaldehyde produces non-specific symptoms of poisoning such as convulsions(similar to those induced by strychnine), restlessness followed by overexcitement, trembling and myoclonia, salivation, dilation of the pupils, dyspnea, increased heart rate, hypothermia, and respiratory arrest which causes death. Patients with metaldehyde poisoning should be given diuretics, emetics, chloral, or bromides.

73-0175. Maki, S. (Ass. of Chem. for Forestry, Tokyo, Japan). **[Agricultural chemicals and their toxicity.]** *Ringyo to Yakuzai (Forest. Pharm.) 38: 19-21; 1971.* (Japanese)

The most widely used herbicide in Japan, sodium chlorate, is discussed regarding properties, degradation patterns, and plant and soil residues. Sodium chlorate can be detected in the soil for about one month at the rate of 10 ppm; the residues volatilize completely in about three months. The lethal oral dose of sodium chlorate for experimental mice and rats ranges from 5,000-7,620 mg/kg and acute epidermal lethal dose for both mice and rats is more than 20,000 mg/kg. The lethal oral dose for dogs ranges from 1200-2800 mg/kg.

The LC50-48 hours for various fish and the results of experiments on the eggs of freshwater fish are presented by tables.

73-0176. Maki, S. (Ass. of Chem. for Forestry, Tokyo, Japan). **[Agricultural chemicals and their toxicity.]** *Ringyo to Yakuzai (Forest. Pharm.) 39: 15-20; 1972;* (Japanese)

Weight fluctuation and methemoglobin tests were given to animals sprayed with 25% solutions of sodium chlorate and sodium chloride and distilled water on their skin, dosed orally and through abdominal injections and s.c. injections. The animals used for tests were mice, rats, pigs, and plovers. No significant results were recognized. However, the formation of methemoglobin appeared faster and more distinctly as a result of s.c. injection rather than abdominal injection. The methemoglobin formation did not reach the level of 5% even after s.c. injection of 0.5 g/kg. A total of 57 workers handling various amounts of sodium chlorate were examined. There was a significant difference in the methemoglobin content of a group handling sodium chlorate and that of the control group. However, in any case, the methemoglobin content level was less than 10%. The toxic level of methemoglobin content is considered 20%.

73-0177. Cabejszek, I.; Maleszewska, J.; Stanislawska, J. (Inst. Communal Hyg. of the Reg. Hyg. Inst., Warsaw, Poland). **Wplyw Tritoxu na biocenoze eksperymentalnych zbiornikow wodnych. [The effect of Tritox on biocenosis of experimental water pools.]** *Rocz. Panstw. Zakl. Hig. 22(3): 265-275; 1971.* (15 references) (Polish)

Examination of water from several pools after application of liquid Tritox-30 (DDT + methoxychlor + lindane) to soil (14 g/m^2 at a distance of 0.4-7.0 m from one pool) and after direct addition of pesticide to the water (15 or 50 g/600 l.) revealed a significant increase in number of mesophyllic and psychrophyllic and decrease of ammonia forming and nitrate reducing bacteria. A general quantitative reduction of plankton, periphytonic, and benthic organisms was also noticed. A successive regeneration and equilibrium reestablishment took place approximately two months after pesticide application. The reappearance of benthic organisms occurred later and at a slower rate than that of plankton and periphytonic organisms.

73-0178. Syrowatka, T.; Wiadrowska, B.; Jurek, A.; Bankowska, J. ; Bojanowska, A. (Inst. Sanit. Toxicol. of the Reg. Inst. of Hyg., Warsaw, Poland). **Badania wplywu zinebu i manebu na funkcje tarczycy. [Investigations on the effect of zineb and maneb on thyroid function.]** *Rocz. Panstw. Zakl. Hig. 22(3): 369-373; 1971.* (11 references) (Polish)

A single intragastric dose of zineb (1300 mg/kg = ¼ LD50) to Wistar rats caused a slight decrease in labeled iodine uptake by erythrocytes (36.46 ± 5.58 as compared to 46.11 ± 2.77% in controls) when measured by the Hamolski test. Comparative determination of ^{131}I uptake by thyroids of rats after a single ¼ LD50 dose of zineb or maneb in the presence or absence of exogenous TSH (thyroid-stimulating hormone 48 μg subcutaneously) indicated a slight depressing effect on secretion of TSH by the pituitary after zineb, but not after maneb administration. Chromatography of thyroid homogenates obtained from these rats indicated that a single ¼ LD50 dose of these fungicides has no significant effect on the ratio of mono to diiodotyrosine content in the thyroid.

73-0179. Wojcik, J.; Ranke-Rybicka, B. (Inst. Communal Hyg. of the Reg. Inst. of Hyg., Warsaw, Poland). **Wrazliwosc kijanek *Xenopus laevis Daudin* i *Rana temporaria* na Tritox-30 (DDT, Gamma-HCH, DMDT). [Sensitivity to Tritox-30 (DDT, lindane, methoxychlor) by tadpoles of *Xenopus laevis Daudin* and *Rana temporaria* L.]** *Rocz. Panstw. Zakl. Hig. 22(4): 413-419; 1971.* (22 references) (Polish)

In the first part of the experiment mortality was determined for 12 day old, 14.5 mm long tadpoles kept for 96 hours in biologically active water (from aquarium) containing different amounts (0.0, 0.015, 0.030, 0.060, 0.024, 0.96 and 1.92 mg/l.) of liquid Tritox-30. After 24 hours 6.7% of *Xenopus laevis* and 5% of *Rana temporaria* tadpoles died in water containing 1.92mg/l; after 96 hours 83.4% and 72.5% had died. At the lowest concentration 10% and 12.5% were dead after 96 hours. In the second part of the experiment the surviving tadpoles were transferred to water without Tritox and their mortality and growth determined over an 18 day period. *Xenopus laevis* tadpoles were more sensitive to Tritox-30 than *R. temporaria:* none previously exposed to 0.96 and 1.92 mg/l. survived the second day after transfer; among *R. temporaria* 15.4% and 9.9% were still alive after 18 days. Mortality was closely related to amount of previous exposure: the higher the concentration of Tritox-30 the poorer the survival. Growth (length) was also strongly affected by concentration. After 96 hours of exposure to the highest concentration, the average length was 17 mm (as compared to 20 mm of controls); after 18 days controls had grown an average of 10 mm, tadpoles exposed to 0.24 mg/l. of Tritox (highest concentration which *Xenopus laevis* survived) only 2.5 mm. The use of *Xenopus laevis Daudin* tadpoles as a biological model for the determination of the deleterious effect of pesticides in water is recommended.

73-0180. Wojcik, J.; Szyszkowska, A.; Beskid, M. (Reg. Inst. of Hyg., Warsaw, Poland). **Zmiany morfologiczne w watrobie bialego szczura wywolane preparatem Tritox-30 podawanym w wodzie do picia. [Morphological changes in the liver of white rats caused by Tritox-30 administered in drinking water.]** *Rocz.*

Panstw. Zakl. Hig. 22(5): 571-578; 1971. (20 references) (Polish)

Tritox-30, a mixture of DDT, methoxychlor, and lindane, caused extensive damage to hepatic parenchyma in female, 150 g, Wistar rats. The chemical was administered by gastric tube to groups of ten rats for seven consecutive days in doses of 37.5 mg/kg, 75 mg/kg, and 150 mg/kg corresponding to 2.5%, 5%, and 10% of LD50. The effect was most pronounced in animals receiving 37.5 mg/kg. Morphological signs of damage included obliteration of the lobular structure of the liver, frothy parenchymal cell cytoplasm with large clear areas, vesicular nuclei with macropapillar chromatin, and distinctly delineated nucleoli. These changes were accompanied by a significant decrease in RNA and glycogen content, decreased activity of mitochondrial enzymes (succinic dehydrogenase and cytochrome oxidase), and appearance of various amounts of fats in the cytoplasm.

73-0181. Syrowatka, T.; Jurek, A.; Nazarewicz, T. (Reg. Inst. of Hyg., Warsaw, Poland). **Chroniczna krotkookresowa toksycznosc *o*-izopropoksy fenylo-*N*-metylokarbaminianu (propoksuru). [Short term chronic toxicity study of *o*-isopropoxyphenyl-*N*-methyl-carbamate (propoxur).]** *Rocz. Panstw. Zakl. Hig. 22(5): 579-589; 1971.* (12 references) (Polish)

The effect of propoxur (0, 250, 500, 1,000, and 2,000 ppm concentration in daily feedings) was determined on groups of 20 (10 male, 10 female) Wistar rats (150-180 g). The food intake and body weight of females was markedly reduced on the 16 week diet containing 1,000 and 2,000 ppm; this effect was not noted in males. No significant change in the percentage of organ/body weight ratio occurred. The cholinesterase activity of whole blood decreased after the 12th week of feeding $>$ 500 ppm. After termination of the experiment, the cholinesterase activity was depressed markedly in brain tissue, plasma, and whole blood of animals receiving 1,000 and 2,000 ppm. The activities of plasma carboxylesterase, alanine aminotransferase, lactic dehydrogenase, and glutamic dehydrogenase remained within normal limits. Although the blood picture was not affected, some histopathological changes (necrosis, proliferation of bile ducts) were noted in livers of animals receiving 1,000 and 2,000 ppm.

73-0182. Palut, D.; Grzymala, W. (Reg. Inst. of Hyg., Warsaw, Poland.) **Wchlanianie, przemieszczanie w tkankach i wydalenie tionofosforanu *O,O*-dwumetylo-*O*-2,4,5-trojchlorofenylu (fenchlorfosu) u szczurow. [Absorption, distribution in tissues and excretion of *O,O*-dimethyl-*O*-2,4,5-trichlorophenyl-phosphorothioate (fenchlorphos, ronnel) in rats.]** *Rocz. Panstw. Zakl. Hig. 2(5): 591-596; 1971.* (11 references) (Polish)

Fenchlorphos ^{32}P was administered (10 mg/kg) by intragastric tube to Wistar rats (150 g wt.) and radioactivity determined in urine, feces, liver, brain, kidney, whole blood, plasma, and red blood cells. Excretion was most rapid during the first 24 hours (74.5%. urine 60.5%, feces 14.0%). After 72 hours 89.2% of total radioactivity was recovered. After 6 hours, the liver had 3% and the kidney 1% of the administered dose. The values dropped to 1.3% and 0.5% after 12 hours and 0.5% and 0.1% after 48 hours. In contrast, brain tissue contained only trace amounts ($<$0.1%) and showed a tendency to persist after an initial drop between 6-12 hours. In blood the radioactivity reached a peak at 9 hours, then gradually decreased up to 72 hours. Later, blood like brain tissue showed a tendency to persist (up to 96 hours). Presence of the unaltered compound was detected by thin layer chromatography in the feces but not in urine; its oxygen analog was not detected in feces or urine.

73-0183. Helwig, A. (Dept. of Bacteriol., State Lab. for Soil and Crop Res., Lottenborgvej 24, 2800 Lyngby, Denmark). **Microbial breakdown of the fungicide benomyl.** *Soil Biol. Biochem. 4(3): 377-378; 1972.* (3 references)

Evidence of microbial breakdown of benomyl was obtained in experiments with isolates from soil enriched with benomyl. When the fungicide was used as sole source of carbon and nitrogen in an agar medium, organisms active in decomposition showed up after 2 mo incubation at 25° as colonies surrounded by clear zones. (The material is only slightly soluble and normally gives the agar a cloudy appearance.) Four strains of bacteria and two fungi were isolated from the colonies. Extracts from clear zones around isolates were found to be inactive against *P. citrinum* while extracts from the cloudy area had a marked fungistatic effect.

73-0184. Denys, A.; Levy, J.; Michel-Ber, E. (Service de Jeanne Levy et de L. Buchel, Inst. de Pharmacol., Paris, France). **Caracteres de l'induction enzymatique provoquee chez la Souris par le chlordane. II.—Action de quelques inhibiteurs de la synthese protidique chez les souris traitees massivement ou chroniquement par le chlordane. [Nature of the enzyme induction produced by chlordane in mice. II. Effect of some protein synthesis inhibitors in mice treated with massive or chronic doses of chlordane.]** *Therapie 27(4): 649-665; 1972.* (15 references) (French)

The effects of two protein synthesis inhibitors (ethionine and cycloheximide) were studied in Swiss line male mice treated with massive or chronic doses of chlordane. Varying doses of chlordane were administered intraperitoneally; ethionine in doses of 200 mg/kg was injected 30 min before the administration of chlordane. Daily 4 mg/kg doses of cycloheximide were given intraperitoneally on two consecutive days, the first 30 min before, and the second 24 hr after the administration of chlordane. Sodium pentobarbital in doses of

50 mg/kg as effector was administered intraperitoneally. While ethionine inhibited the induction produced by massive doses of chlordane (7.5 and 30 mg/kg), it had no effect on the induction produced by a repeated injection of a 7.5 mg/kg dose of chlordane in chronically pretreated mice. Cycloheximide inhibited the induction produced by a single chlordane dose of 7.5 mg/kg, but it had no effect on the same chlordane dose administered repeatedly to chronically pretreated mice. The increase in the induction intensity in mice pretreated chronically with chlordane is not influenced by ethionine and cycloheximide. This phenomenon appears not to be due to an increase in the protein synthesis.

73-0185. Kojima, K.; Inoue, H.; Amma, K.; Yamamoto, T.; Yamasaki, A.; Murata, K.; Hamamoto, M.; Kato, E.; Shibata, E.; Ito, R. (Toxicol. Lab., Life Sci. Res. Inst., Kumiai Chem. Ind. Co. Ltd., Shizuoka Prefect., Japan). **[Toxicological studies on 6-benzylaminopurine, acute and subacute toxicity.]** *Toho Igakkai Zasshi (J. Med. Soc. Toho Univ.) 19(3-4): 336-355; 1972.* (10 references) (Japanese)

Acute and subacute toxicity tests in rats and mice were performed with 6-benzylaminopurine (6-BAP), a plant growth regulator for grapes. In the acute toxicity tests, a suspension of 6-BAP in 0.25% aqueous carboxymethylcellulose was administered orally or subcutaneously to strain dd mice and Wistar rats. Dermal toxicity was measured by painting a solution of 6-BAP in DMSO onto the shaved skin of the back of rats. The peroral LD50 to male and female rats after 10 days of observation was 2.125 and 2.130 g/kg respectively; LD50 p.o. to male and female mice 1300 mg/kg; LD50 s.c. to male and female mice $>$ 2.3 g/kg, and dermal LD50 to male and female mice, $>$ 5.0 g/kg. Symptoms of poisoning included lassitude, decrease of spontaneous movement, lacrimation, and prostration. Intraocular and dermal application provided no evidence of a primary irritant effect. In subacute feeding tests, administration of 6-BAP to rats and mice at 0.005-1% in the diet resulted in the death of all mice in the highest-dosage group. Abnormalities were observed in kidney and pancreas of rats in the 0.5% group.

73-0186. Kobayashi, S.; Toida, S.; Kawamura, H.; Chang, H. S.; Fukuda, T.; Kawaguchi, K. (Res. Lab., Hokko Chem. Ind. Co. Ltd., Atsugi, Japan). **[Chronic toxicity of 2,4-dichlorophenol in mice. A simple model for the toxicity of pesticide metabolite residues.]** *Toho Igakkai Zasshi (J. Med. Soc. Toho Univ.) 19(3-4): 356-362; 1972.* (6 references) (Japanese)

Acute and chronic (6-mo) toxicity of 2,4-dichlorophenol (a metabolite of several pesticides including 2,4-D, nitrofen, and chlorfenuinpos) was used as the model for studies to design a rapid, simple experimental procedure. In the acute oral tests 2,4-D was administered to groups of mice and rats by stomach tube as a 10-20% solution in peanut oil. Two doses were given with an 18-hr interval. LD50 values found (p.o.) were as follows: male and female LCR mouse, 1.6 g/kg body weight; male SD rat, 3.67 g/kg; female SD rat, 4.5 g/kg. In the chronic experiments commercial diets containing 0.02-0.2% 2,4-dichlorophenol were fed *ad lib.* to strain dd mice. In mice sacrificed after 6 mo of feeding, no outstanding pathological changes were seen. The change which could be anticipated to be produced by the phenol, irregularity in liver cell size, was only slightly apparent in one mouse in the highest dosage group. Liver weights and SGPT levels were also slightly reduced in this group. The maximum no-effect level of 2,4-dichlorophenol in feed was 100 mg/kg/day. The test procedure seemed suitable for rapid assessment of pesticide metabolite residue toxicity.

73-0187. Ito, R.; Kawamura, H.; Chang, H. S.; Toida, S.; Matsu-ura, S.; Sasaki, T.; Tanihata, T. (Sch. of Pharmacol., Fac. of Med., Toho Univ., Tokyo, Japan). **[Acute, subchronic, and chronic toxicity of *O,O,O',O'*-tetramethyl-*O,O'*-thio-di-*para*-phenylene phosphorothioate (Abate).]** *Toho Igakkai Zasshi (J. Med. Soc. Toho Univ.) 19(3-4): 363-367; 1972.* (4 references) (Japanese)

The acute toxicity of Abate was investigated, using 16 groups of 10 male 5-6 wk-old Donryu-strain rats each. Abate was administered orally (in 20% Tween 20 suspension) at eight levels from 888 to 5560 mg/kg, and subcutaneously at eight levels from 455 to 2857 mg/kg. Symptoms of poisoning included convulsions, lacrimation, piloerection, diarrhea, and hematuria. After one wk of observation, a p.o. LD50 value of 1226 mg/kg, and a s.c. LD50 of 2405 mg/kg were found. In short-term and subchronic tests, Abate was administered at 0.5-0.02 LD50 per day for 30 or 90 days. No pronounced pathological findings were obtained. The erythrocyte count increased and the leukocyte count decreased slightly. Weights of liver, spleen, kidney, and thymus decreased. Nonspecific histological changes were noted in liver, kidneys, and adrenals of the high-dosage groups, especially in the p.o.-treated animals. Changes included atrophy or fat deposition in the liver, congestion or fat deposition in kidneys, and increased lipid contents of adrenals.

73-0188. Mayer, Jr., F. L.; Street, J. C.; Neuhold, J. M. (Fish-Pestic. Res. Lab., Bureau of Sport Fisheries and Wildl., U.S. Dept. of Inter., Columbia, MO 65201). **DDT intoxication in rainbow trout as affected by dieldrin.** *Toxicol. Appl. Pharmacol. 22(3): 347-354; 1972.* (12 references)

Rainbow trout were dosed po with 5 mg DDT alone and in combination with 0.04 mg or 0.20 mg

dieldrin on alternate days, four treatments in all. Fish were also pretreated on four alternate days with 0.20 mg dieldrin per dose followed by four alternate day treatments of 5 mg DDT per dose. The presence of dieldrin resulted in reduced mortality from DDT intoxication. The time until death after demonstrating signs of intoxication was also much longer in fish receiving dieldrin in addition to DDT than in those receiving DDT only. DDT increased with time in adipose tissue, but the lethal brain levels of DDT were nearly constant. It was observed that rainbow trout die at a much lower brain level of DDT than reported for rats or birds. (Author abstract by permission)

73-0189. Palmer, K. A.; Green, S.; Legator, M. S. (Cell Biol. Branch, Div. of Toxicol., Food and Drug Admin., Washington, DC 20204). **Cytogenetic effects of DDT and derivatives of DDT in a cultured mammalian cell line.** *Toxicol. Appl. Pharmacol. 22(3): 355-364; 1972.* (10 references)

Cytogenetic effects of *p,p'*-DDT, *o,p'*-DDT, *p,p'*-DDD (TDE), *o,p'*-DDD, *p,p'*-DDE, *o,p'*-DDE, and *p,p'*-DDA were investigated in a mammalian cell line (rat kangaroo). In this cell line, *p,p'*-DDA was toxic at 200 μg/ml, amd the other compounds caused toxic effects at concentration of 20-50 μg/ml. Mitotic inhibition was moderate in cultures treated with *p,p'*- or *o,p'*-DDT and slight in those treated with *p,p'*- and *o,p'*-DDD or DDE; none was observed with *p,p'*-DDA. The *p,p'*-isomers of DDT, DDD, and DDE produced a 2-fold increase in chromosome abnormalities as compared with their corresponding *o,p'*-isomers. At a concentration of 10 μg/ml, the *p,p'*-isomers of DDT, DDD, and DDE caused chromosome damage in 22.4, 15.5, and 13.7% of the cells, respectively. Of these cells, approximately 12% of the chromosome damage caused by *p,p'*-DDT and *p,p'*-DDE was exchange figures; only 1.2% of the abnormalities caused by *p,p'*-DDD was exchange figures. The *o,p'*-isomers and control cells exhibited no exchange figures. (Author abstract by permission)

73-0190. Wells, M. R.; Yarbrough, J. D. (Dept. of Zool., Mississippi State Univ., State College, MS 39762). **Retention of ^{14}C-DDT in cellular fractions of vertebrate insecticide-resistant and susceptible fish.** *Toxicol. Appl. Pharmacol. 22(3): 409-414; 1972.* (9 references)

DDT resistant and susceptible populations of mosquitofish (*Gambusia affinis*) were assayed for DDT retention in particulate fractions of livers and brains following in vivo and in vitro treatment with ^{14}C-DDT. Livers and brain were homogenized, and particulate fractions were prepared by differential centrifugation and counted for radioactivity. The in vivo studies indicate a significant difference in retention between brains from susceptible and resistant fish and point to a membrane barrier to DDT in tissues from resistant fish. There is also a more effective blood-brain barrier in resistant fish than in susceptible fish. There was a difference in total distribution of DDT based on percent retention in brain tissue of resistant and susceptible fish. It appears that the cell membranes of resistant fish retain DDT, thus reducing the amount entering the cell. The opposite effect is seen in the mitochondrial membrane as DDT is apparently prevented from entering rather than being membrane bound. In the in vivo liver treatments the heavy microsome fraction was the only significantly different cell component in which the heavy microsomes from resistant fish retained more ^{14}C-DDT than those from susceptible fish. For the in vitro treatments all liver fractions from susceptible fish showed a significantly greater retention than did those from resistant fish. (Author abstract by permission)

73-0191. Mull, R. L.; Giri, S. N.; Peoples, S. H. (Dept. of Physiol. Sci., Sch. of Vet. Med., Univ. of California, Davis, CA 95616). **Effects of an acutely toxic dose of the avicide 3-chloro-*p*-toluidine in chickens.** *Toxicol. Appl. Pharmacol. 22(3): 458-464; 1972.* (14 references)

The acute effects of the avicide 3-chloro-*p*-toluidine were studied. It was hoped that this study would reveal possible mechanisms for the toxicity of this compound in chickens. The signs of toxicity included hypoglycemia, depletion of liver glycogen, an excessive buildup of uric acid in the plasma, a selective loss of protein content from the kidney and a shift in the white blood cells. No significant changes were found in the activity of serum glutamic-oxaloacetic transaminase, tissue or serum phosphatases (except an increase in the activity of alkaline phosphatase at 6 hr), protein content of the liver, or the plasma sodium and potassium concentrations of birds treated with 3-chloro-*p*-toluidine. (Author abstract by permission)

73-0192. Ottoboni, A. (California Dept. of Pub. Health, Berkeley, CA 94704). **Effect of DDT on the reproductive life-span in the female rat.** *Toxicol. Appl. Pharmacol. 22 (3): 497-502; 1972.* (12 references)

Twelve pairs of littermate female Sprague Dawley derived rats were divided into two diet groups of like littermate composition and were fed diets containing 0 or 20 ppm technical DDT from weaning until termination of the experiment. They were bred for the first time at the age of 3 mo and every 2 mo thereafter until 11 breedings were accomplished. The males employed in the study were young adults of proven fertility obtained from the same colony as the females and maintained on control diets between breeding periods. The females receiving 20 ppm DDT had a significantly longer average reproductive life-span (14.55 mo) than did their littermate controls (8.91 mo). The number of females becoming pregnant after the age of 17 mo (8 DDT vs 1 control) and the number of successful pregnancies after the age of 17 mo (11 DDT vs 1 control) were significantly different between the two groups. (Author abstract by permission)

72-0193. Wolcott, R. M.; Neal, R. A.* (Div. of Clin. Immunol., Dept. of med., Med. Cent., Univ. of Alabama, Birmingham, AL). **Effect of structure on the rate of the mixed function oxidase catalyzed metabolism of a series of parathion analogs.** *Toxicol. Appl. Pharmacol. 22(4): 676-683; 1972.* (18 references)

Various concentrations of a series of phenyl substituted diethyl phosphorothionates were incubated with rabbit liver microsomes and the rates of formation of the corresponding phenyl substituted diethyl phosphates and of diethyl phosphorothioic acid were determined. From these data the *Km* and *Vmax* values for the formation of these mixed function oxidase catalyzed metabolites were calculated. A plot was made of the log of the *Vmax* values for the formation of the phenyl substituted phosphates or diethylphosphorothioic acid against the Hammett σ constants for the substituents on the phenyl ring of the various phenyl substituted diethyl phosphorothionates. These plots indicated that there was no linear relationship between the rates of formation of these metabolites and the electron withdrawing or donating properties of the substituted phenyl groups. A statistical comparison of the *Km* and *Vmax* values for the formation of the phenyl substituted diethyl phosphates and diethyl phosphorothioic acid from the corresponding phenyl substituted diethyl phosphorothionates reveals some differences. These differences are discussed. (Author abstract by permission)

73-0194. Bass, S. W.; Triolo, A. J.; Coon, J. M. (Dept. of Pharmacol., Jefferson Med. Coll., Philadelphia, PA 19107). **Effect of DDT on the toxicity and metabolism of parathion in mice.** *Toxicol. Appl. Pharmacol. 22(4): 684-693; 1972.* (23 references)

Pretreatment with DDT or DDE protected mice against the toxicity of the organophosphate parathion, but not against the toxicity of its active metabolite, paraoxon. In accord with these results, DDT pretreatment protected against the inhibition of plasma, whole blood and brain cholinesterase by parathion, but did not protect against the inhibition of whole blood or brain cholinesterase following paraoxon. In contrast to what might be expected from the toxicity studies, liver microsomes and 900 *g* supernatant fractions of the liver from mice treated with DDT or DDE converted more parathion to the active metabolite paraoxon than did controls. The rate of detoxication of paraoxon by these liver fractions was not affected by DDT or DDE treatment. DDT pretreatment prolonged hexobarbital sleeping time in the mouse. This response is in opposition to the usual decrease in sleeping time seen with DDT and other microsomal enzyme stimulants in the rat. An increased rate of conversion of parathion to the inactive product, diethyl phosphorothionic acid, has been suggested as a possible mechanism by which DDT pretreatment protects against the toxicity of parathion. (Author abstract by permission)

73-0195. Hudson, R. H.; Tucker, R. K.; Haegele, M. A. (U.S. Bureau of Sport Fisheries and Wildl., Denver Wildl. Res. Cent., Denver, CO 80225). **Effect of age on sensitivity: Acute oral toxicity of 14 pesticides to mallard ducks of several ages.** *Toxicol. Appl. Pharmacol. 22(4): 556-561; 1972.* (13 references)

Acute po LD50 values for 14 common pesticides (4 central nervous system stimulants and 10 anticholinesterases) were determined on mallard ducks (*Anas platyrhynchos*) aged 36 hr, 7 days, 30 days, and 6 mo. The youngest mallards were more sensitive than the oldest to six compounds and less sensitive to eight. The extremes in susceptibility to a compound between age groups were generally less than three-fold. The four central nervous system stimulants produced LD50 values that decreased from 36 hr to 7 or 30 day old animals, and increased from animals aged 7 or 30 days to 6 mo. Eight of the 10 anticholinesterase compounds produced LD50 values that increased from 36 hr to 7 or 30 day old animals, and decreased from animals aged 7 or 30 days to 6 mo. The results indicate that young animals are not always more susceptible to pesticides than adults of a species. It is recommended that age-susceptibility factors be considered in the development of standardized toxicological protocols. (Author abstract by permission)

73-0196. Puyear, R. L.; Paulson, G. D. (Zool. Dept., N. Dakota State Univ., University Station, Fargo, ND 58102). **Effect of carbaryl (1-naphthyl *N*-methylcarbamate) on pentobarbital-induced sleeping time and some liver microsomal enzymes in White Leghorn cockerels.** *Toxicol. Appl. Pharmacol. 22(4): 621-627; 1972.* (20 references)

White Leghorn cockerels were given a po dose of carbaryl (1-naphthyl *N*-methylcarbamate) at the rate of 0, 10, 25, 50, 100, 200, 300, or 400 mg/kg of body weight for three or six days. Carbaryl treatment of 100 mg/kg and above caused a decrease in sodium pentobarbital-induced sleeping time and an increase in the liver weight. Carbaryl treatment at 100 mg/kg and above caused an increase in liver aniline hydroxylase activity. Liver aminopyrine demethylase activity increased after treatment with carbaryl at the rate of 200 mg/kg or more. A slight and variable increase in liver cytochrome P450 content occurred after treatment with 300 or 400 mg of carbaryl per kg of body weight. Pretreatment of cockerels with sodium pentobarbital caused little change in the rate of excretion of ^{14}C given as 1-naphthyl-1-^{14}C *N*-methylcarbamate. (Author abstract by permission)

73-0197. Cabral, J. R.; Testa, M. C.; Terracini, B. (Istituto Nazionale per lo Studio e la Cura dei Tumori, Div. di Oncologia Sperimentale A, Milan, Italy). **Mancanza di effetti a lungo termine della somministrazione dell'insetticida eptacloro a ratti lattanti. [Lack of long-**

term effects from heptachlor administration to suckling rats.] *Tumori 58(1): 49-53; 1972.* (9 references) (Italian)

Carcinogenicity of heptachlor given to suckling Wistar rats (five 10 mg/kg doses in corn oil once in two days, intragastrically) was studied in 95 animals. Seven rats died before weaning while no early deaths were recorded among the 36 controls given only corn oil. No early pathological alterations could be detected upon morphological investigation of the 29 rats killed 60 weeks after the beginning of the experiment. Growth rates and survival were alike in both experimental and control groups. Tumor incidence at different sites in males and females was comparable in both groups of animals sacrificed at the age of 106 to 110 weeks. Administration of 50 mg/kg of heptachlor to suckling rats produced no carcinogenic effects under the experimental conditions.

See also **73-0002** **73-0006** **73-0012** **73-0016** **73-0021** **73-0046** **73-0059** **73-0077** **73-0239** **73-0241**

73-0198. Wolff, J. P. (Ecole Superieur d'Application des Corps gras, Paris, France). **Criteres analytiques et methodes de controle des corps gras. [Analytical criteria and control methods for fats.]** *Aliment. Vie 59: 15-30; 1971.* (25 references) (French)

Methods of quantitative and qualitative analysis of fats and fatty products and their metal and pesticide residues are reviewed. Although highly toxic, organophosphorus pesticides are largely metabolized by plants which eliminates the problem of their determination. Organochlorine pesticides, even in very low concentrations, can be identified easily and determined by gas chromatography with an electron capture detector; however, separating them from triglycerides and decomposition products of fats and oils is difficult. Various techniques have been developed for the successive extraction of organochlorine pesticides with solvent systems such as acetonitrile-hexane. Storherr's joint distillation method, applied to quality tests of such products as butter, olive oil, lard, and tallow, uses hexane vapor and nitrogen flux for separating organochlorine pesticides on sand and glass beads at 250°C. The condensation and separation from volatile oil components is done on a Florisil column.

73-0199. Jensen, S.; Renberg, L. (Swedish Environ. Protection Board, Special Analytical Lab., Walkenberg Lab., Univ. of Stockholm, Sweden). **Contaminants in pentachlorophenol: chlorinated dioxins and predioxins (chlorinated hydroxy-diphenylethers).** *Ambio 1(2): 62-65; 1972.* (7 references)

By using ion exchange, diazomethane treatment, GC-MS and TLC, octachloro-dioxin and 2-hydroxy-nonachlorodiphenyl ether (predioxin) were identified in a purified extract from a technical pentachlorophenate (PCP). Predioxin appeared to be unstable in the gas chromatograph and formed octachloro-dioxin. An extract from a technical organic salt of PCP contained 4- or 3-hydroxy-nonachlorodiphenyl ether (*iso*-predioxin), with the hydroxyl group in a position precluding closure to a dioxin. Levels of chlorinated dioxins (D7, D8), predioxins (PD7, PD8), and *iso*-predioxins(*iso*-PD7, *iso*-PD8) in some commercial preparations of PCP were estimated. The amine salt preparation had the highest levels of contaminants. The level of chlorinated dioxin (D8) was 330 ppm.

73-0200. Betteridge, D.; Thompson, M.*; Baker, A. D.; Kemp, N. R. (Dept. of Chem., Univ. Coll. of Swansea, Singleton Park, Swansea SA2 8PP, Wales, U.K.). **Photoelectron spectra of phosphorus halides, alkyl phosphites and phosphates, organo-phosphorus pesticides, and related compounds.** *Anal. Chem. 44(12): 2005-2010; 1972.* (18 references)

The photoelectron spectra of 15 phosphorus-containing compounds, including three pesticides, have been obtained. During these measurements, instrument memory and side-reaction effects were observed. Several of the spectra have been interpreted with the aid of simple molecular orbital theory. The spectra of the compounds are sufficiently different to allow qualitative identification. The analytical significance of the results is discussed. (Author abstract reprinted by permission of the American Chemical Society)

73-0201. Lawrence, J. F.; Frei, R. W.* (Trace Analysis Res. Cent., Dept. of Chem., Dalhousie Univ., Halifax, Nova Scotia, Canada). **Fluorigenic labeling of *N*-methyl- and *N,N*-dimethylcarbamates with 4-chloro-7-nitrobenzo-2,1,3-oxadiazole.** *Anal. Chem. 44(12): 2046-2049; 1972.* (14 references)

The quantitative analysis of *N*-methyl- and *N,N*-dimethylcarbamate insecticides is carried out by *in situ* fluorimetric evaluation of their 4-chloro-7-nitrobenzo-2,3,1-oxadiazole (NBD-Cl) derivatives after thin-layer chromatography. NBD-Cl reacts with alkyl amines to form highly fluorescent derivatives which are detectable at concentrations of 1 ng/spot or less. The carbamates are hydrolyzed in 0.1*M* $NaHCO_3$ and the resulting alkyl amines react with NDB-Cl in methyl isobutyl ketone to yield derivatives which are separated by thin-layer chromatography and analyzed by *in situ* fluorimetry with an Aminco-Bowman Spectrophotofluorometer or a Zeiss Chromatogram Spectrophotometer. Reaction rates, fluorescence phenomena, and chromatographic properties are investigated to determine the quantitative potential of the method. A reproducibility of about 4% relative standard deviation can be expected for this method. The procedure is applied successfully to the analysis of natural water and soil samples which contain low parts-per-billion amounts of carbamate. (Author abstract reprinted by permission of the American Chemical Society)

73-0202. Lab. de Chimie Appliquee a l'Expertise (Fac. de Pharm., Montpellier, France). **Technique du dosage des residus de benomyl dans les fruits et les legumes. [A method for the determination of benomyl residue in fruits and vegetables.]** *Ann. Fals. Expert. Chim. 65(701): 241-246; 1972.* (6 references) (French)

The method is based on the extraction of the benomyl residue by a 0.1 *N* solution of hydrochloric acid saturated with ethyl acetate. The extract is purified as stipulated by the method for the determination of thiabendazole (see Abstract No. 71-2313), and the UV spectrum of benzimidazolecarbamic acid methyl ester (BCM) is determined spectrophotometrically. The determination of benomyl residues presents a special problem due to the instability of benomyl. After delays of varying duration depending on dilution, benomyl solutions yield a spectrum with two bands at 282 ± 1 and 288 nm in aqueous solutions of ethyl acetate, methanol, or chloroform. These final spectra are in all cases those of BCM, which must therefore be the substance deter-

mined. The method is applicable to residues exceeding 0.08 mg BCM/kg, which is equivalent to 0.12 mg benomyl/kg. About 90% recovery is attained.

73-0203. Heilbronn, E.; Mikiver, M.; Thorsell, W. (Sundbyberg, Sweden). **Electrometric cholinesterase methodology in the monitoring of biocide workers.** *Arch. Environ. Health 25(5): 370-373; 1972.* (36 references)

A rapid electrometric method for the determination of butyrylcholinesterase and acetylcholinesterase in small capillary blood samples is applied to biocide workers. For comparison a semiquantitative method, Merckotest Cholinesterase, is used. Greater sensitivity to small changes in erythrocyte activity, as found in biocide workers, underlines the importance of use of this enzyme in surveillance. (Author abstract by permission)

73-0204. Larini, L.; Prado, A. B.; Carvalho, D. De.; Silva, H. C. (Faculdade de Farmacia e Odontologia de Araraquara, Sao Paulo, Brazil). **Metodo para a extracao e purificacao de insecticidas clorados em material biologico para fins toxicologicos. [A method for the extraction and purification of chlorinated pesticides from biological material for toxicological study purposes.]** *Arq. Inst. Biol. (Sao Paulo) 38(3): 115-123; 1971.* (38 references) (Portuguese)

A procedure for the extraction and purification of seven organochlorines such as BHC, DDT, aldrin, dieldrin, endrin, heptachlor, and chlordane from biological material is presented. Homogenized 40-g samples are extracted with acetone under reflux at 60 to 70°C for 15 min. The extracts are then concentrated on a water bath, filtered, and cooled to 0°C (to remove lipids), then filtered again. The filtrates are transferred into a separatory funnel, diluted with water, and treated with a saturated sodium sulfate solution. The aqueous acetone mixture is extracted four times with light petroleum ether and the combined extract evaporated on a water bath to a 2-ml volume, and transferred to an activated aluminum oxide column. The latter is then washed with an ethanol/acetone/water (50/30/20/ v/v) mixture, and 50 ml of eluate collected. The eluate is evaporated to dryness with a dry air stream, and the residue dissolved in 10 ml of ethanol and passed through a filter containing anhydrous sodium sulfate. Ethanol is then evaporated to dryness and the residue dissolved in acetone to be applied on thin-layer chromatoplates. Recovery experiments indicated the following recoveries for this extraction procedure: 92% for BHC; 80% for DDT; 69% for aldrin; 86% for endrin; 94% for heptachlor; and 84% for chlordane.

73-0205. Petrocelli, R. M.; Yoneda, H.; Yajima, T. W.; Matsunaga, A. K. (Inst. Biol. Sao Paulo, Sec. Quim., Sao Paulo, Brazil). **Metodo de separacao de toxafeno-parathion. [A method for the separation of toxaphene and parathion mixtures.]** *Arq. Inst. Biol. (Sao Paul) 38(3): 133-134; 1971.* (Portuguese)

Columns packed with Florisil (100 to 200 mesh, activated at 110°C and suspended in a 60-80°C petroleum ether fraction containing 2% v/v of acetone) are used to separate toxaphene from parathion occurring in commercial preparations. Approximately 0.8-g samples are applied to a 25-cm high column, 1 cm in diameter. The extraction solvent (mentioned above) is applied in 10 ml fractions and total elution of toxaphene is usually achieved with 50 ml of solvent. Further treatment of the column with 110 ml of the same solvent allows recovery of the retained parathion. Quantitative determination of toxaphene is then performed by IR spectrophotometry, and parathion is determined by gas-liquid chromatography. Separation of the two compounds is tested by subjecting several eluate samples to TLC on 250 μ silica gel G; plates are developed with benzene and viewed under UV light for spot identification.

73-0206. Yuki, F.; Horiba, M.; Kitahara, H.; Murano, A. (Takarazuka Res. Lab., Sumitomo Chem. Ind. Co. Ltd., Takarazuka, Japan). **[Analytical studies on pesticides and related compounds XX. Determination of furamethrin in mosquito coils.]** *Bunseki Kagaku (Jap. Anal.) 21(8): 1051-1056; 1972.* (4 references) (Japanese)

Furamethrin is a new pyrethroid insecticide used in mosquito coils and electric mosquito killers. A method for determining furamethrin in such formulations is needed. When mosquito coils were extracted with acetone in a Soxhlet apparatus, the percentage recovery was too low to be determined. However, after addition of activated charcoal to the crushed mosquito coil, the recovery of furamethrin was better than 95%. Addition of *n*-hexane to the acetone facilitates the procedure because of the reduction in extraction of materials from the coil base. When coils were shake-extracted with methanol, the extraction time required was shorter, and the entire process simplified, although the recovery rate was lower. Using a 1:1 *n*-hexane/acetone mixture, 1 g charcoal per coil, and an extraction time of 3 hr, a recovery of 95% was obtained with a variation coefficient of 2.3%. The extracted furamethrin is determined by FID gas chromatography, using allethrin as the internal standard, and a glass column filled with acid-washed, silanized Chromosorb W packing coated with 3% sodium borate and 15% silicone DCHV grease.

73-0207. Horiba, M.; Yuki, F.; Kitahara, H.; Kobayashi, A.; Murano, A. (Takarazuka Res. Lab., Sumitomo Chem. Ind. Co. Ltd., Takarazuka, Japan). **[Determination of resmethrin in mosquito coils.]** *Bunseki Kagaku (Jap. Anal.) 21(10): 1333-1338; 1972.* (8 references) (Japanese)

A method was developed for determining resmethrin in mosquito coils by extraction and gas chro-

matography. The recovery of resmethrin from mosquito coils by Soxhlet extraction with common organic solvents was unsatisfactory, and some materials extracted from the coil base interfered with the stability and recovery of the active ingredient. The most effective method found for removing interfering materials, after several adsorbents were tested, was that of mixing the powdered coil with powdered active charcoal and refluxing the mixture with acetone. Recovery was better than 96% with a coefficient of variation of 1.34% when a mixture of acetone and *n*-hexane was used as the solvent. The continued presence of materials from the coil base necessitated further TLC cleanup prior to gas chromatography. With slight modifications, the same procedure could be used for simultaneous determination of resmethrin and allethrin.

73-0208. Krylova, N. A. (F. F. Erisman Sci. Res. Inst. of Hyg., Moscow, USSR). **Opredeleniye tsineba v vozdukhe po ditiokarbaminovoy gruppe. [Determination of zineb in the air by the dithiocarbamate group.]** *Gig. Sanit. 37(3): 62-64; 1972.* (3 references) (Russian)

A colorimetric method for the determination of zineb in the air is described. The method is based on the capacity of the ethylene-bis-dithiocarbamate group to regenerate hexavalent molybdenum from phosphomolybdic or silicomolybdic acid with formation of molybdenum blue. The silicomolybdic acid used for the analysis is prepared from 2% sodium silicate, 3% solution of ammonium molybdate, and 1*N* hydrochloric acid. The filter sample containing zineb is washed repeatedly with 2.5% solution of sodium hydroxide, after which silicomolybdic acid is added to the eluate to obtain blue coloration immediately. Green coloration, stable over 8-10 hours, is then reached by the addition of 1*N* HCl. The absorption peak lies in a range of 670-690 nm. In addition to being sensitive (2.5 μg/5.5 ml), the above method is selective and requires a maximum of 15 min for determination. Carbon disulfide, ethylenediamine, zinc salts, and inert ingredients of commercial zineb fail to interfere with the determination.

73-0209. Lyalikov, Yu. S.; Dranovskaya, L. M. (Inst. of Chem., Moldavian SSR Acad. Sci., Kishinev, USSR). **Spektrofotometricheskoye opredeleniye geksakhlorbutadiyena (GKhBD) v pochve i vode. [Spectrophotometric determination of hexachlorobutadiene in soil and water.]** *Gig. Sanit. 37(5): 57-59; 1972.* (3 references) (Russian)

A method was developed to determine hexachlorobutadiene, recently introduced as a fumigant in viticulture, in soil and water samples simultaneously containing other pesticides. Soil or water samples are extracted with cyclohexane. The soil extracts are concentrated and washed with sulfuric acid, then with distilled water, and dried. The extracts from water are dried with sodium sulfate, then concentrated. The cyclohexane solutions are spotted onto thin-layer plates for chromatographic cleanup. If no pesticides or other materials which may interfere with the determination are present, the spot of adsorbent containing hexachlorobutadiene is scraped from the plate and eluted with cyclohexane. The optical density of the eluate is read in a spectrophotometer at 223 nm, and the hexachlorobutadiene content obtained from a calibration curve. If interfering materials are present, two TLC plates are prepared and run simultaneously. One, run with standards, is used to establish the *Rf* of the test compound under the given experimental conditions, and the other is eluted for measurement. Maximum error for water samples is 20%, for soil samples, 25%. The calibration curve is linear at 2-20 μg/ml, and the limit of detection is 2 μg.

73-0210. Parsenyuk, L. N.; Dubranovskaya, A. A. (Dept. Gen. Hyg., Dnepropetrovsk Med. Inst., Dnepropetrovsk, USSR). **On the determination of residual hexachlorane (BHC) in soil.** *Hyg. Sanit. 35(12): 383-384; 1970.* (1 reference)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 35(12): 70-71; 1970, see Abstract no. 71-2771.

73-0211. Dyatlovitskaya, F. G.; Botvinova, L. E. (F. L. Marzeyev Res. Inst. of Gen. and Environ. Hyg., Kiev, USSR). **Separate determination of DDT and kelthane (dicofol) in industrial effluents.** *Hyg. Sanit. 36(1): 87-89; 1971.* (3 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 36(1): 72-74; 1971, see Abstract no. 71-2772.

73-0212. Kosmatyi, E. S.; Kavetskii, V. N. (Ukrainian Res. Inst. Plant Protect., Kiev, USSR). **Chromatographic determination of residual dipterex (trichlorfon) in plants.** *Hyg. Sanit. 36(1): 105-108; 1971.* (3 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 36(1): 87-89; 1971, see Abstract no. 71-2773.

73-0213. Sıpin, G. S.; Ivanchenko, V.V. (All-Union Res. Inst. Chem. Protect. Plants, Moscow, USSR). **Polarographic determination of residual organophosphorus pesticides.** *Hyg. Sanit. 36(3): 415-519; 1971.* (45 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 36(3): 76-79; 1971, see Abstract no. 72-0868.

73-0214. Talbott, T. D.; Cavagnol, J. C.; Smead, C. F.; Evans, R. T.* (Chemagro Div. of Baychem Corporation,

Kansas City, MO 64120). **Semiautomated analysis of granular organophosphorus pesticide formulations.** *J. Agr. Food Chem. 20(5): 959-963; 1972.* (3 references)

The determination of Dasanit (fensulfothion) [*O,O*-diethyl *O*-[4-(methylsulfinyl)phenyl] phosphorothioate] and Di-Syston (disulfoton) [*O,O*-diethyl *S*-[2-(ethylthio)ethyl] phosphorodithioate] in 10 and 15% clay granular formulations is now carried out on a semiautomated basis. The procedure involves an extraction of the granular samples with an acetic acid bromine mixture and subsequent colorimetric phosphorus determination using an Auto Analyzer. The method produced significant savings in analytical time and decreased the precision standard deviation by about 50% over previous manual methods. (Author abstract reprinted by permission of the American Chemical Society)

73-0215. Newsome, W. H. (Res. Lab., Health Protect. Branch, Dept. of National Health and Welfare, Ottawa, Canada). **Determination of ethylenethiourea residues in apples.** *J. Agr. Food Chem. 20(5): 967-969; 1972.* (8 references)

Ethylenethiourea was determined in apples in the 0.01-1.00 ppm range with an overall recovery of 94.7 ± 5.9%. The procedure involves conversion to the *S*-benzyl derivative, followed by extraction, trifluoroacetylation, and quantitative measurement by gas-liquid chromatography. The cleanup is rapid and effective. Specific confirmation of the derivative was carried out by mass spectrometry. Commercial samples were found to contain 0.018-0.044 ppm of ethylenethiourea. (Author abstract reprinted by permission of the American Chemical Society)

73-0216. Locke, R. K. (Div. of Toxicol., Food and Drug Admin., U.S. Dept. of Health, Education and Welfare, Washington, DC 20204). **Thin-layer chromatography of 1-naphthyl *N*-hydroxy, *N*-methylcarbamate and its application in two *in vitro* studies involving carbaryl.** *J. Agr. Food Chem. 20(5): 1078-1080; 1972.* (18 references)

1-Naphthyl *N*-hydroxy *N*-methylcarbamate (*N*-hydroxycarbaryl) cochromatographs with carbaryl (1-naphthyl *N*-methylcarbamate) or 5-hydroxycarbaryl (5-hydroxy-1-naphthyl*N*-methylcarbamate) in several TLC systems commonly used for the separation of carbaryl metabolite aglycones. Two TLC systems are described which separate *N*-hydroxycarbaryl from carbaryl, 5-hydroxycarbaryl, 4-hydroxycarbaryl (4-hydroxy-1-naphthyl *N*-methylcarbamate), α-naphthol, *N*-hydroxymethylcarbaryl (1-naphthyl *N*-hydroxymethylcarbamate), 5,6-dihydro-5,6-dihydroxycarbaryl (5,6-dihydro-5,6-dihydroxy-1-naphthyl *N*-methylcarbamate), and 5,6-dihydro-5,6-dihydroxynaphthol. One of these systems has been utilized in preliminary studies which suggest that *N*-hydroxycarbaryl, among other hydroxylation products, is produced from carbaryl by an *in vitro* hydroxylation system previously thought incapable of N oxidation. The same TLC system was used to investigate the nature of the water-soluble metabolites produced from $^{14}C_1$-naphthyl-labeled carbaryl by rat liver cubes maintained in culture medium. Preliminary studies indicate that approximately 3% of these metabolites may represent N-O conjugates of *N*-hydroxycarbaryl. These thin-layer chromatographic indications of *N*-hydroxycarbaryl must still be confirmed by independent means such as infrared and mass spectrometry. (Author abstract reprinted by permission of the American Chemical Society)

73-0217. Mumma, R. O.; Khalifa, S. (Pestic. Res. Lab. and Grad. Study Cent., Dept. of Entomol., Pennsylvania State Univ., University Park, PA 16802). **Mass spectra of trifluoroacetyl derivatives of carbaryl and its aglycone metabolites.** *J. Agr. Food Chem. 20(5): 1090-1091; 1972.*

The *N*-trifluoroacetyl derivatives of carbaryl and the *N,O*-ditrifluoroacetyl derivatives of hydroxycarbaryl (4-, 5-, 6-, and 7-,) were analyzed by gas-liquid chromatography-mass spectrometry. All derivatives possessed parent ions and easily interpretable fragmentation patterns confirming the proposed structures. The derivatives readily lose $-CH_3NCO$ through a rearrangement to form the base ions which subsequently fragment further. *N*-Hydroxymethylcarbaryl did not form a stable trifluoroacetyl derivative and only trifluoroacetyl 1-naphthol was observed. (Author abstract reprinted by permission of the American Chemical Society)

73-0218. Meinen, V. J. (McLaughlin Gormley King Co., Minneapolis, MN 55414). **Gas-liquid chromatographic determination of *d-trans*-allethrin.** *J. Ass. Offic. Anal. Chem. 55(5): 907-912; 1972.* (3 references)

A gas chromatographic method is described for the quantitative determination of *d-trans*-allethrin in the technical product and in various formulations. The samples are diluted with acetone and analyzed by gas chromatography, using a flame ionization detector and a column packed with OV-1 on Chromosorb W (HP). Preliminary work indicates that satisfactory results can be obtained with the technical material and several different formulations. Since this method is more rapid and specific than the present AOAC titrimetric method, it is expected that it will be a valuable supplement to or alternative for the AOAC method for the analysis of allethrin. (Author abstract by permission)

73-0219. Goza, S. W. (Virginia Dept. of Agr. and Commerce, Div. of Technical Services, Richmond, VA 23219). **Infrared analysis of pesticide formulations.** *J. Ass. Offic. Anal. Chem. 55(5): 913-914; 1972.*

The Virginia Department of Agriculture and Commerce Pesticide Formulation Laboratory has compiled

infrared methods for 60 pesticides, which are distributed to other laboratories. Four basic procedures are used and standardized volumes and aliquots, when posible, are specified to simplify sample preparation. One of the standardized procedures is described in detail. (Author abstract by permission)

73-0220. Cavagnol, J. C. (Research Dept., Chemagro Corp. Kansas City, MO 64120). **Analytical studies of Di-Syston formulations.** *J. Ass. Offic. Anal. Chem. 55(5): 918-922; 1972.*

Di-Syston (disulfoton) is used as the technical material and also as granular and liquid formulations. A few of the methods developed for its analysis are outlined: hydrolysis, infrared, gas chromatography, gravimetric procedure, and automated colorimetry. Some of the problems encountered in quality control are also described. (Author abstract by permission)

73-0221. Bontoyan, W. R.; Looker, J. B.; Kaiser, T. E.; Giang, P.; Olive, B. M. (Pestic. Regulation Div., Environ. Protection Agency, Beltsville, MD 20705). **Survey of ethylenethiourea in commercial ethylenebisdithiocarbamate formulations.** *J. Ass. Offic. Anal. Chem. 55(5): 923-925; 1972.* (2 references)

Twenty-eight different ethylenebisdithiocarbamate commercial products were examined for ethylenethiourea (ETU), a degradation product of ethylenebisdithiocarbamates. All products contained ETU, which was identified by thin layer and gas-liquid chromatography, infrared spectrophotometry, and mass spectrography. The techniques and parameters for identification and quantitative measurement are described. (Author abstract by permission)

73-0222. Wayne, R. S.; Groth, W. C.; Miles, J. W.; Guerrant, G. O. (Agr. Div., American Cyanamid Co., Princeton, NJ 08540). **Nonaqueous copper colorimetric method for determination of malathion in technical grade malathion and in malathion formulations.** *J. Ass. Offic. Anal. Chem. 55(5): 926-938; 1972* (10 references)

A nonaqueous copper colorimetric procedure has been developed for the assay of technical and formulated products of malathion. The stability of the copper *O,O*-dimethyl phosphorodithioate complex has been substantially improved by the use of nonpolar solvents and by lowering the hydrogen ion activity of the system. This has permitted the elimination of the partitioning step and has relaxed the critical timing requirements specified in the official first action AOAC method. The new method has a precision of ±1.6% at a 95% confidence level. The accuracy of the technique is discussed in terms of various minor interferences and by contrasting the results obtained with alternative assay methods. (Author abstract by permission)

73-0223. Stevenson, A. (Robinson Brothers Ltd., Ryders Green, West Bromwich, England). **A simple color spot test for distinguishing between maneb, zineb, mancozeb, and selected mixtures.** *J. Ass. Offic. Anal. Chem. 55(5): 939-941; 1972*

Maneb, zineb, mancozeb, and selected fungicidal mixtures can be differentiated by a simple color spot test. Differentiation is based on the colors produced after successive application of acid dithizone, sodium hydroxide, and acid dithizone to the spot. The color depends on the type and concentration of metal present in the sample. (Author abstract by permission)

73-0224. Malina, M.; Rozek, A.; Schwemmer, B. (Velsicol Chemical Corp., Chicago, IL 60611). **AG Chlordane: development of methods for its analysis and control.** *J. Ass. Offic. Anal. Chem. 55(5): 942-947; 1972.*

AG chlordane is a high purity compound containing 95% α- and γ-chlordane. Five methods have been developed for analyzing AG chlordane and its formulations. Two methods involve infrared procedures: assay of AG chlordane in granular formulations and α- and γ-chlordane in AG chlordane. The other three methods used gas chromatography as the determinative step: assay of heptachlor and nonachlor in AG chlordane and AG chlordane in emulsifiable concentrates. The precisions obtained for all 5 methods are good. (Author abstract by permission)

73-0225. Hoermann, W. D.; Formica, G.; Ramsteiner, K.; Eberle, D. O. (Agr. Res. Dept., Ciba-Geigy AG, Basel 21, Switzerland). **Automated method for extraction, cleanup, and gas chromatographic determination of triazine herbicides in soil.** *J. Ass. Offic. Anal. Chem. 55(5): 1031-1038; 1972.* (3 references)

Complete automation of extraction, cleanup, and GLC determination of residue analysis of some important triazine herbicides in soils has been achieved. Manually sieved soil samples are continuously delivered to the system, which presents cleaned up extracts to an automated GLC injection system. Peak areas are calculated by a digital electronic integrator. The output of the integrator is connected to a teletype printer which generates both printed hard copy and a punched paper tape in standard ASCII code. This information is fed by a punchtape reader into a programmed Wang 700 desktop computer. Final analysis reports are printed by an attached typewriter. The system allows a 4-fold output of analytical results with half the personnel compared to manual analysis. (Author abstract by permission)

73-0226. Miles, J. R. W. (Res. Inst., Canada Dept of Agr., London 72, Ontario, Canada). **Conversion of DDT and its metabolites to dichlorobenzophenones for analy-**

sis in the presence of polychlorinated biphenyls. *J. Ass. Offic. Anal. Chem. 55(5): 1039-1041; 1972.* (11 references)

The separation of DDT compounds from interfering polychlorinated biphenyls (PCB) has been effected by oxidation of DDE and DDMU (1-chloro-2,2-bis(*p*-chlorophenyl)ethylene) to the more polar dichlorobenzophenone. DDT and DDD (TDE) (*o,p'*- and *p,p'*-) are dehydrochlorinated by a convenient technique, utilizing 1,5-diazobicyclo[5.4.0] undec-5-ene, and the resulting olefins are oxidized by chromic acid in acetic acid. In subsequent Florisil fractionation, the interfering PCB compounds, relatively unchanged by the dehydrochlorination and oxidation, are eluted in the hexane fraction, while the dichlorbenzophenones are eluted by benzene. Recoveries of *p,p'*-DDE and *p,p'*-DDT added to fish extracts at 5 ppm each were 82.5±2.1 and 86.0±2.2%, respectively. (Author abstract by permission)

73-0227. Krause, R. T. (Food and Drug Admin., Minneapolis, MN 55401). **Quantitative dehydrochlorination of Perthane residues and effect of alcoholic potassium hydroxide on other pesticides.** *J. Ass. Offic. Anal. Chem. 55(5): 1042-1052; 1972.* (13 references)

An alkaline dehydrochlorination procedure is described for the quantitative analysis of Perthane residues in food products by electron capture gas chromatography. Perthane, as the olefin, is detected at a level as low as 0.02 ppm in vegetables and fruits and 0.2 ppm in fatty food products. Perthane is quantitatively recovered from fresh spinach, fresh pears, and butterfat by the appropriate official AOAC multiple residue method. The average recoveries obtained for these products are 102, 104, and 98%, respectively. Retention data are given for 46 pesticides before and after alkaline treatment for the 10% DC-200, 10% DC-200/15% QF-1, and 3% DEGS columns. Only toxaphene and Strobane cannot be separated from Perthane before dehydrochlorination. After the alkaline treatment, only chlordane, toxaphene, and Strobane cannot be separated from the Perthane olefin. (Author abstract by permission)

73-0228. Rogers, W. M. (Food and Drug Admin., Baltimore, MD 21201). **The use of a solid support for the extraction of chlorinated pesticides from large quantities of fats and oils.** *J. Ass. Offic. Anal. Chem. 55(5): 1053-1057; 1972.* (11 references)

A solid support with a large surface area and a high affinity for oils has been used as a vehicle to suspend extracted fats and oils on its surface. Extraction of the fat-coated particles with an acetone-acetonitrile solvent mixture allows a quantitative isolation of chlorinated pesticide residues with a co-extraction of only about 1 g fat from a 30 g original sample. Recoveries of five chlorinated pesticides added to corn oil and butterfat samples at the 0.01 and 0.30 levels ranged from 83 to 100%. Satisfactory agreement between the proposed method and the official AOAC petroleum ether-acetonitrile partitioning method is obtained for various high fat products containing incurred cholinated pesticide residues. The increased sensitivity and speed of the described method allow the rapid performance of qualitative, quantitative, and confirmatory analyses on a single sample. (Author abstract by permission)

73-0229. Chau, A. S. Y.; Lanouette, M. (Inland Waters Branch, Dept. of the Environ., Ottawa, Ontario, Canada K1Y2P5). **Confirmation of pesticide residue identity. II. Derivative formation in solid matrix for the confirmation of DDT, DDD, methoxychlor, Perthane, *cis*-and *trans*-chlordane, heptachlor, and heptachlor epoxide pesticide residues by gas chromatography.** *J. Ass. Offic. Anal. Chem. 55(5): 1058-1066; 1972.* (19 references)

A new approach has been developed for the simultaneous confirmation of DDT-type compounds, chlordanes, heptachlor, and heptachlor epoxide. Derivatives are formed by a solid matrix derivation technique in alumina/KOH and alumina/potassium *tert.*,-butoxide. It is compared with the previously reported solution derivation technique. The high yield and simplicity of the present procedure should be useful in routine analysis, particularly for samples with a low concentration of the parent pesticide. (Author abstract by permission)

73-0230. Masumoto, H. T. (Food and Drug Admin., Los Angeles, CA 90015). **Study of the silicic acid procedure of Armour and Burke for the separation of polychlorinated biphenyls from DDT and its analogs.** *J. Ass. Offic. Anal. Chem. 55(5): 1092-1100; 1972.* (8 references)

The silicic acid procedure of Armour and Burke for the separation of polychlorinated biphenyls from DDT and its analogs produces an adequate separation of Aroclor 1260. However, the procedure cannot completely separate *p,p'*-DDE from Aroclors 1221, 1232, 1212, and 1254. Factors causing variable column properties were examined. The 7 hr minimum period for silicic acid activation was found to be inadequate for reproducible water-silicic acid preparations. A 24 hr minimum period is suggested. The use of Celite in column preparation often results in improperly prepared columns and should be eliminated. Nonreproducible columns might also be due to a heterogeneous, water-silicic acid adsorbent which is a result of an irregular distribution of water molecules onto the silicic acid particles. (Author abstract by permission)

73-0231. Miles, J. W.; Goette, M. B.; Guerrant, G. O.; Churchill, II, F. C. (Center for Dis. Control, Pub. Health Service, Savannah, GA 31402). **Argentimetric method for determination of malathion in formulations.** *J. Ass. Offic. Anal. Chem. 55(5): 1133-1141; 1972.* (7 references)

A method has been developed for the determination of malathion in technical grade products by argentimetric titration of the dimethylphosphorodithioate ion formed by alkaline cleavage of the molecule. Free dimethylphosphorodithioic acid and other polar impurities are removed by a column of cellulose powder containing 30% moisture. Malaoxon, isomalathion, and diethylmercaptosuccinate do not interfere. However, the methyl ethyl ester of malathion, if present, will titrate as malathion. The method has been adapted to the analysis of formulations of emulsifiable concentrates, water-dispersible powders, and dusting powders. The analyses can be performed potentiometrically by titration to a fixed millivoltage, using a pH meter, or with an automatic titrator operated in the derivative mode. When the method was applied to samples of technical grade malathion, the standard deviation varied from 0.21 to 0.42%. (Author abstract by permission)

73-0232. St. John, Jr., L. E.; Bache, C. A. (Pestic. Residue Laboratory, Cornell Univ. Ithaca, NY 14850). **Simplified Coulson electrolytic conductivity detector for chlorinated hydrocarbons.** *J. Ass. Offic. Anal. Chem. 55(5): 1152-1153; 1972.* (7 references)

A simple plug of Gas-Chrom Q as a gas flow restrictor inserted in the combustion tube of the electrolytic conductivity detector eliminates the need for expensive valving when the detector is used in the chlorine mode without a platinum catalyst. (Author abstract by permission)

73-0233. Gitsova, S. (Unified Res. Inst. Hyg. and Labor Protection,Sofia, Bulgaria). **V'rkhu nalichiyeto na pestitsidi v prirodnite vodi i metodite za tyakhnoto opredelyane. [The presence and determination of pesticides in natural waters.]** *Khig. Zdraveopazvane 14(4): 407-414; 1971.* (128 references) (Bulgarian)

Effects, removal, and analysis of pesticide residues in natural waters are reviewed. Organoleptic features, pH, and dissolved oxygen as affected by the presence of different compounds are mentioned. Use of activated charcoal for organochlorine pollution control is considered the best approach compared to chemical oxidation and coagulation procedures. Analytical aspects are discussed in terms of the four basic stages: sampling and sample storage, isolation and enrichment, purification of the extract, and actual detection and quantitative determination. Samples should be stored in glass or aluminum rather than polyethylene containers to prevent pesticide adsorption on the plastic wall surface. Isolation from the aqueous phase by means of activated charcoal followed by desorption of the pesticide-containing phase with chloroform, glacial acetic acid, petroleum ether or benzene is recommended for organochlorines. Direct extraction of organochlorines, organophosphates, chlorophenoxy-acids, and triazines from the aqueous phase can be done using solvents such as hexane, pentane, chloroform, ethyl or petroleum ether, and others. Aluminum-oxide, silica gel, or Florisil column chromatography is used. Determination of organochlorines, carbamates, and organophosphates is accomplished with spectrophotometry including colorimetry, UV, and IR spectroscopy.

73-0234. Izmirova, N.; Benchev, I. (Unified Res. Inst. of Occupational Hyg. and Safety, Sofia, Bulgaria). **Enzimatichen metod za opredelyane fosfororganichni pestitsidi. [An enzymatic method for the determination of organophosphate pesticides.]** *Khig. Zdraveopazvane 15(2): 196-201; 1972.* (34 references) (Bulgarian)

Rabbits were given Gardona (tetrachlorvinphos) (400 mg/kg p.o., single dose) to test the usefulness of a modification of Ackerman's procedure for the determination of organophosphate cholinesterase inhibitors in blood and urine samples. Samples taken 2 to 24 hr after treatment and prepared according to Ackerman (*Arch. Toxikol.* 24, 1969), were applied to silica gel chromatoplates and chromatographed with hexane:acetone (4:1) as a carrier. Plates were then developed by spraying with a 1:1 dilution of horse serum with a pH 8.2 phosphate buffer and left for a 1 hr incubation in a wet chamber at room temp. Spraying with an indoxyl acetate solution (10 mg in 1 ml acetone) mixed with a 0.01 *M* cupric acetate and phosphate buffer solution revealed the presence of intact Gardona and its metabolites as white spots on a blue background within 5-15 minutes. Gardona could be detected at 100 μg/100 ml in blood two hours after administration (Rf=0.33). Gardona metabolites with 0.53 and 0.96 Rf's were found in urine samples 24 hr after administration of the compound. Use of horse serum as a source of esterase activity and of indoxylacetate as a specific reagent in the presence of cupric ions made it possible to determine parathion, methyl parathion, and Gardona in amounts as low as 0.002 ng, using this solvent system, and intrathion (Thiometon) at 100 ng using benzene:acetone (95:5) as an eluent.

73-0235. Shishkov, A. N.; Magayeva, S. D.; Karaivanov, S. Y. (Paisiy Khilendarskiy Superior Pedagogic Inst., Dept. Anal. Chem. Plovdiv, Bulgaria). **Titrimetrichen metod za opredelyane na tsinkov etilen-bis-ditiokarbamat i negovi poluprodukti i preparati. [Determination of zinc ethylene-bis-dithiocarbamate and its semifinished products and preparations by means of a titration method.]** *Nauch. Tr. Vissh. Pedagog. Inst. Plovdiv. Mat. Fiz. Khim. Biol. 9(3): 105-111; 1971.* (9 references) (Bulgarian)

A method for the determination of zineb and its derivatives by complexometric titration is presented. Zineb is selectively extracted from formulations or other specimens by shaking for 2-3 min with pyridine. Purified zineb is precipitated from the extract by adding water, maintaining at 50°C on a water bath, and salting out

with a mixture of hydrochloric acid and sodium chloride. The precipitate is filtered out and incinerated at 700-800°C. The mineral residue, obtained within 5-10 min, is dissolved in concentrated hydrochloric acid and titrated with complexon III in the presence of Eriochrome Black T or Xylene Orange. The error of the determination is less than 10%, taking the values obtained by Clarke's method as a reference.

73-0236. Takase, I.; Ohsuga, S. (Pestic. Res. Lab., Nippon Tokushu Noyaku Seizo Co. Ltd., Tokyo, Japan). **[Micro-analytical methods in gas chromatography. VI. Method for analysis of carbamate insecticide residues as 2,4-dinitrophenyl ether derivatives.]** *Noyaku Seisan Gijutsu (Pestic. Tech.) 28: 15-16; 1972.* (Japanese)

Substituted phenyl *N*-methyl carbamates can be determined gas chromatographically as the 2,4-dinitrophenyl ether derivatives following the reaction of the phenols, formed by alkaline hydrolysis, with 2,4-dinitrofluorobenzene. Crushed, unpolished rice and soil samples were spiked with 0.1, 0.2, or 1.0 ppm of 2-isopropoxyphenyl-, *m*-tolyl-, 3,4-xylyl-, or 2-*sec*-butylphenyl-*N*-methylcarbamate. The specimens were extracted with aqueous acetone, then with methylene chloride, and the extract partitioned into acetonitrile and *n*-hexane. The acetonitrile layer was condensed, and the active ingredient isolated by TLC using *n*-hexane/ethyl acetate/formic acid (60/40/1 v/v/v) as the solvent. The residue was treated with a 1% solution of 2,4-dinitrofluorobenzene in acetone and a pH 11 buffer for 45 min at 50°C. The reaction mixture was extracted with *n*-hexane and cleaned up on a Florisil column with *n*-hexane-ethyl ether (85/15 v/v) as the eluant. The eluate was injected onto a gas chromatograph (column length 150 cm, internal diameter 3mm, packed with 10% silicone DC200-Gas Chrom Q), using NBNP as the internal standard. The limit of detection was 0.002 ppm, and the recovery better than 80% from rice and 90% from soil for the carbamates tested. Commercial carbamates can be separated by selecting GLC conditions.

73-0237. Ishii, Y.; Yamashita, T.; Kohno, M. (Agr. Chem. Inspection Station, Tokyo, Japan). **[Studies on analysis of carbamate insecticide residues. Carbaryl residues on edible crops.]** *Noyaku Seisan Gijutsu (Pestic. Tech.) 28: 17; 1972.* (Japanese)

Optimum conditions for the gas chromatographic determination of carbaryl residues on edible crops were investigated. A 100-g crop sample was extracted with 300 ml of methylene chloride and the extract dried. The solvent was distilled off from a 200-ml aliquot of the extract and the residue dissolved in 100 ml of acetone. The acetone solution was treated with 100 ml of a coagulant solution containing 1 g ammonium chloride and 2.5 g of 85% phosphoric acid. The solution was permitted to stand for 15 min, then filtered, and the residue washed with the coagulant. The combined filtrate and washings were extracted three times with methylene chloride, then the methylene chloride layer washed with dilute alkali. The methylene chloride was distilled off, and the residue dissolved in methanol and hydrolyzed with methanolic sodium hydroxide. The methanol was distilled off and the residue dissolved in dilute sodium hydroxide and the solution washed with benzene. Ten ml of a 4% solution of chloroacetic anhydride in benzene was added to exactly 20 ml of the aqueous solution. The mixture was shaken for one min, and the benzene layer removed, washed, and dried. The benzene solution was then subjected to GLC. Recovery ranges on tomato, cucumber, lettuce, and unpolished rice, respectively, were 63.3-80.5%, 68.6-102.1%, 77.1-98.4%, and 65.0-87.8%.

73-0238. Kamiji, M.; Kanazawa, J.; Miyahara, K. (Nat. Inst. of Agr. Sci., Min. of Agr. and Forest., Tokyo, Japan). **[Studies on residue analysis of carbamate insecticides. II. Residues of *m*-tolyl *N*-methylcarbamate (MTMC) on rice plants.]** *Noyaku Seisan Gijutsu (Pestic. Tech.) 28: 18-19; 1972.* (Japanese)

A method for determination of MTMC on rice plants was developed in order to permit studies of residue degradation and distribution. The specimens were extracted with ethylene chloride and partitioned between *n*-hexane and acetonitrile; the acetonitrile layer was washed with *n*-hexane then extracted with ethylene chloride after diluting with 4% aqueous sodium chloride solution. The extract was purified successively by passage over a Florisil column, eluting with methylene chloride saturated with water, and passage over an activated alumina column, eluting with *n*-hexane containing 10% acetone, and distilling off the solvent. The residue was dissolved in 0.2 ml of ethyl acetate and 0.2 ml of anhydrous trifluoroacetic acid, and heated for 3 hr at 50°C. The reaction mixture was made up to 5 ml with 15/1 hexane/ethyl ether. The hexane layer was washed with water, then dried, and injected into the gas chromatograph. Studies using this method showed that residues of MTMC in rice paddy soil and plant parts declined rather rapidly beginning 1-2 wk after application, depending on the climatic conditions. Uptake and translocation in the rice plant are limited.

73-0239. Masuda, T.; Kanazawa, J.; Inoue, H. (Nat. Inst. of Agr. Sci., Tokyo, Japan). **[Determination of methomyl residues on potatoes.]** *Noyaku Seisan Gijutsu (Pestic. Tech.) 28: 22-23; 1972.* (Japanese)

A method was developed for determination of methomyl and its two principal metabolites, the sulfoxide and the sulfone, in potatoes, potato plants, and the soil in which they were grown. Dehydrated specimens of plants, tubers, or soil were extracted with methylene chloride, and the extracts cleaned up on silica gel using a suitable eluting solvent for each compound (hexane/ethyl acetate 1/2 v/v for methomyl; hexane/-

ethyl acetate 1/3 v/v for methomyl sulfone; and acetone for methomyl sulfoxide). The use of a FPD gas chromatograph affords chromatograms usable for determination of all three compounds. IR spectrometry can also be used for identification. The limit of detection for methomyl was 0.01 ppm and for the sulfoxide and sulfone, 0.1 ppm. No residues were detectable in potato tuber specimens analyzed 10 and 42 days after the last of six applications of methomyl. Small quantities (0.99-2.06 ppm) of methomyl were detected in the aerial plant parts at this time, but no sulfoxide or sulfone was detected, probably due to the higher limits of detection. Methomyl was present in the 0-10 cm soil layer at 0.4-0.5 ppm during this interval, but metabolites were not detectable.

73-0240. Abe, H.; Akazaki, K. (Res. Lab. of Biol. Sci., Kumiai Chem. Ind. Co. Ltd., Shizuoka, Japan). **[Residue analysis of Neoasozin in soil.]** *Noyaku Seisan Gijutsu (Pestic. Tech.) 28: 24-25; 1972.* (Japanese)

Neoasozin (iron methanearsonate, MAF) has previously been determined by conversion to inorganic arsenic then using a conventional analysis for the latter. However, this procedure is not suitable for the determination of MAF in soils where the natural level of inorganic arsenic is high. Conditions for extraction of MAF from soil without conversion to the inorganic form were therefore examined. The studies showed that MAF was not hydrolyzed by heating for 6 hr at 90°C in 6 *N* HCl, and extraction of soil with 6 *N* HCl at room temperature was effective in removing MAF. The MAF can subsequently be converted to inorganic arsenic by heating for 3 hr or more in a sulfuric-nitric acid mixture. The molybdenum blue method can be used for colorimetric determination of inorganic arsenic in the soil extract and in the digested MAF solution. The simultaneous presence of organically bound arsenic does not interfere in the determination of inorganic arsenic by this method. The recovery of 10 ppm MAF added to soil samples was 81.2%.

73-0241. Oya, T.; Shinozaki, C.; Takano, J. (Biochem. Res. Lab., Nissan Chem. Ind. Co. Ltd., Shiraoka, Saitama Prefect., Japan). **[Analysis of residues of oxadiazone, an herbicide.]** *Noyaku Seisan Gijutsu (Pestic. Tech.) 28: 26-27; 1972.* (Japanese)

A method was developed for the determination of residues of oxadiazone (2-*tert*-butyl-4-(2′,4′-dichloro-5′-isopropyloxyphenyl)-5-oxo-1,3,4-oxadiazoline) and 11 of its possible metabolites in unpolished rice, rice straw, and rice paddy soil. The specimens were extracted with acetone/ethanol (1/1 v/v), filtered, and concentrated under reduced pressure. The residue was partitioned in hexane and acetonitrile and the acetonitrile layer concentrated. The compounds sought were isolated by TLC with a cyclohexane/ethyl acetate (9/1) solvent system, cleaned up on a Florisil column, and injected into a gas chromatograph. The recovery rate for oxidiazone and the group of metabolites in which the 5-isopropyl group was degraded to methyl and hydrogen was 93-79% in unpolished rice, 87-99% in rice straw, and 97-100% in soil. Recovery of other possible metabolites synthesized and added to specimens in the studies was hampered by their instability. Application of this method to specimens collected from 14 prefectures revealed no oxidiazone or presumed metabolites in unpolished rice, only 0.1 ppm in rice straw, and 0.2 ppm in soil, three mo after application. Very small quantities of some presumed metabolites were found in the upper soil layer. Thus the half-life of oxidiazone in soil was calculated as 2-3 mo at an application rate of 1 kg/ha.

73-0242. Ko, F.; Nagase, M. (Takarazuka Res. Lab., Sumitomo Chem. Ind. Co. Ltd., Takarazuka, Japan). **[Simultaneous determination of each component in a pesticide formulation containing more than one organophosphorus insecticide.]** *Noyaku Seisan Gijutsu (Pestic. Tech.) 28: 30-31; 1972.* (Japanese)

Individual organophosphate components contained in a formulation can be determined by selecting an appropriate gas chromatographic packing material and a hydrogen flame ionization detector. With papthion (phenthoate) or fenitrothion as internal standard, calibration curves passing through a common origin could be obtained under the following conditions: glass column, 1.5 m long, 3 mm i.d., packed with 2% Apiezon L grease on Chromosorb W; injection temperature 175°C; detector temperature 200°C; carrier gas: N_2, 40 ml/min; H_2 flow 30 ml/min; air flow 900 ml/min; and chart speed, 10 mm/min. Individual peaks for dimethoate, papthion, fenitrothion, malathion, parathion, conen, and surecide were separated clearly enough to permit direct calculation of peak area. Recovery was 99.4-101.9%. Emulsion concentrates were extracted with chloroform, filtered, and concentrated.

73-0243. Kawahara, T.; Moku, M. (Agr. Chem. Insp. Sta., Min. of Agr. and Forest., Tokyo, Japan). **[Studies on organochlorine pesticide residues in crops and soils. XVII. Relationship between residue extractability and size of crushed rice.]** *Noyaku Seisan Gijutsu (Pestic. Tech.) 28: 32-33; 1972.* (Japanese)

Differences in extractability of BHC isomers from several sizes of crushed and sifted particles of unpolished and polished rice by three methods of extraction with various solvents were studied. It was found that the Soxhlet method using acetone gave better extraction except for the β-isomer, which was extracted more completely by shaking with hexane. When shake extraction was used, the α-isomer in unpolished rice and the β-isomer in polished rice showed maximum extractability at 40-60 mesh size (50 ppb contamination) and at 20-40 mesh (17 ppb), the other isomers showing increased extract-

ability as the size decreased. When whole grain was extracted, all isomers except the β-isomer were extracted more completely by the high-frequency method than by shaking.

73-0244. Watanabe, M.; Kashiwa, T. (Agr. Chem. Insp. Sta., Min. of Agr. and Forest., Tokyo, Japan). **[Simplified method for determining pesticide residues by TLC densitometry.]** *Noyaku Seisan Gijutsu (Pestic. Tech.) 28: 34-35; 1972.* (Japanese)

The applicability of TLC densitometry for rapid analysis of various pesticide formulations was studied. First approximately 200 technical pesticides were broken down into 6 x 6 classes based on the locations of their UV absorption maxima between 210 and 360 nm and the optimal concentration for reading the absorption spectrum. Two spots of an unknown solution of Baycid (fenitrothion) and three spots of a Baycid solution of known concentration were placed on a TLC plate with a 10μl microsyringe at 2-cm intervals. The spots were developed to 12 cm with a mixture of benzene and acetone (4/1 v/v), then determined directly with a densitometer. The values obtained were compared with those obtained with the usual TLC-vanadomolybdate method as follows: the Baycid content of a commerical 50% Baycid EC was 51.68% (±4.19%), by the new method and 51.73% (± 0.53%) by the standard method. Although the error range is still large, the method will apparently be useful for preliminary screening of large numbers of specimens in routine work, and further improvements will be studied.

73-0245. Ichihashi, M.; Ogawa, Y.; Oyama, J. (Central Lab., Ishihara Ind. Co. Ltd., Shiga Prefect., Japan). **[Analysis of a new herbicide, X-52 (2,4-dichloro-3′-methoxy-4′-nitro-diphenyl ether) in formulations, crops, and soil.]** *Noyaku Seisan Gijutsu (Pestic. Tech.) 28: 38-39; 1972.* (Japanese)

To determine the content of X52 herbicide in formulations, a one-gram specimen is extracted with 120 ml of methylene chloride in a Soxhlet extractor for 48 hr, then the solvent evaporated. After addition of 60 mg of CNP (2,4,5-trichloro-4′-nitrodiphenyl ether) to the dried residue, the mixture is dissolved in 1 ml of DMF; 1 ml of acetone is added to the solution, and a 5μl aliquot is injected onto a TCD gas-liquid chromatograph. Since the minimum amount of X52 detectable by GLC-ECD is 0.025 ng, the method is suitable for determining X52 residues in crops. Cleanup of crop extracts is troublesome due to the presence of some plant components with peaks corresponding to that of X52. These components could not be removed by any type of column chromatography; however, the problem was solved by reducing the sample with sodium borohydride and partitioning between *n*-hexane and acetonitrile. Specimens of unpolished rice and rice straw from various localities contained X52 residues far below the limit of detection by this method, i.e., 0.001 ppm. Benzene was most suitable for extraction of X52 from soil because of the affinity of X52 for soil moisture. Recovery was almost complete. Cleanup of soil extracts was not required for specimens of less than 5 g. According to a model experiment, the half-life of X52 in flooded paddy soil is ca. one month.

73-0246. Balbaa, S. I.; Abdel-Kader, E. M.; Abdel-Wahab, S. M.; Zaki, A. Y.; El-Shamy, A. M. (Pharmacognosy Dept., Fac. of Pharm., Cairo Univ., U.A.R.). **Comparative study between different methods used for estimation of pyrethrins and a new suggested method.** *Planta Med. 21(4): 347-352; 1972.* (9 references)

A new chromatographic method for the determination of pyrethrins I and II gave lower results than the commonly used Seil, mercury reduction or sulfur colorimetric methods since it measured only pyrethrins and not nonpyrethrolone esters and degraded or polymerized inactive compounds. A light petroleum extract of *Chrysanthemum cinerariaefolium* Visiani was spotted on silica gel G plates, and spots were developed with cyclohexane:ethyl acetate 4:1. Spots corresponding to pyrethrin I and pyrethrin II were eluted with absolute alcohol; the solvent was evaporated and the residue mixed with 5 ml of phosphoric acid:acetic anhydride 80:20, and heated. The color intensity was measured within 40 min in an S.P. 500 spectrophotometer.

73-0247. Das, D. K.; Mathew, T. V.; Mitra, S. N. (Central Food Laboratory, Calcutta 16, India). **Identification and quantitative estimation of chlorinated organic pesticide residues in cereals.** *Res. Ind. 15(2): 108-110; 1970.* (5 references)

Two hundred ml of isopropyl alcohol are added to 250 g of finely chopped and well-mixed cereal sample, the mixture blended for 5 min, 400 ml benzene added, and blending done again for 5 min. The procedure is repeated with 400 ml of isopropanol-benzene (1:2) mixture. The mass is centrifuged, and the extract is removed and diluted up to one liter with isopropanol-benzene. The solvent is evaporated from the extract using a Kuderna-Danish apparatus. To remove the nonpesticidal constituents, the extract is partitioned by acetonitrile-hydrocarbon and percolated through a magnesium celite column. The pesticide sample and a standard solution are spotted on TLC plates, developed, and the pesticide identified by its *Rf* value. Another set of plates are spotted with known amounts of the same pesticide along with the sample and developed. The spots are removed, dissolved in 5 ml distilled alcohol in different test tubes, and spectrophotometrically analyzed at a 540 nm wavelength to determine the pesticide concentration as a function of optical density.

73-0248. Mukherjee, G.; Mathew, T. V.; Mitra, S. N. (Central Food Lab., Calcutta, India). **Separation and**

identification of malathion, sumithion and parathion by TLC on magnesium hydroxide. *Res. Ind. 16(4): 281-282; 1971.* (7 references)

Magnesium hydroxide was found to be a good substitute for silica gel and other TLC adsorbents in the separation of organophosphates. Plates with a 250 μm coating of magnesium hydroxide were dipped in 5% solution of formamide in ethyl ether and air-dried for five min. After application of 10 μl. of solutions of malathion, sumithion, or parathion, they were developed in an ascending manner with 2,2,4-trimethyl pentane. Brown and yellow spots which remained visible for a long time were obtained when the plates were sprayed with 0.05% $PdCl_2$. Complete separation was achieved and sensitivity was 1μg. The plates were resistant to chipping and abrasion and easy to handle and preserve.

73-0249. Paez, D. M; Farah, M. (Catedra de Quimica Toxicologica y Legal, Fac. de Ciencias Fisico, Quimico, Matematicas, Univ. Nacional de Cuyo, San Luis, Argentina). **Metodo rapido para la identificacion de compuestos organofosforados en sangre por cromatografia en microplacas. [A rapid thin-layer chromatographic method for the identification of organophosphates in blood.]** *Rev. Asoc. Bioquim. Argent. 36(194-195): 127-131; 1971.* (7 references) (Spanish)

A simplified method for the detection of parathion and malathion, as well as some of their metabolites such as paraoxon or malaoxon, in biological fluids is presented. The compounds are extracted by direct treatment of blood samples with an ethyl ether/petroleum ether (30:70) mixture, and the solvent evaporated. The residue is redissolved in a small volume of ethyl acetate, applied to 7x5 cm silica gel G plates and developed with *n*-hexane/acetone (5:1) or cyclohexane/acetone/chloroform (7:2.5:0.5). Plates are sprayed (after 10 min air-drying at room temperature) with a 4-*p*-nitrobenzyl pyridine (4-NBP) reagent (a 2% solution of 4–NBP in acetone). Blue spots appearing on a white background after 10 min of drying at 110°C indicate the presence of parathion and malathion at *Rf* 0.52 and 0.39 respectively, if the binary solvent is used, and at *Rf* 0.50 and 0.44, respectively, if the ternary carrier solvent is used. The procedure requires 40 minutes if the plates are prepared in advance and allows detection of 1 ppm pesticide in the blood sample.

73-0250. Larini, L.; Prado, A. B. (Fac. Farm. Odontol. Araraquara, Cadeira Bromatol., Araraquara, Brazil). **Separacao e identificacao de pesticidas clorados atraves da cromatografia em camada delgada. [Separation and identification of organochlorine pesticides by thin-layer chromatography.]** *Rev. Fac. Farm. Odontol. Araraquara 4(2): 213-228; 1970.* (37 references) (Portuguese)

Solutions of technical BHC, DDT, aldrin, dieldrin, endrin, heptachlor, and chlordane in acetone were used to establish optimum TLC separation and identification conditions. Samples were applied to chromatoplates with 300 μlayers of silica gel G which had been activated for 1 hr at 105°C. Plates were developed with petroleum ether (40-60° fraction) alone, petroleum ether/carbon tetrachloride (1/1 v/v), or cyclohexane/ethyl acetate (9/1 v/v). Plates were sprayed with a 0.1% solution of benzidine in ethanol and exposed to solar or UV radiation for 1 to 3 min. Optimal resolution was provided by one of the first two solvents. Four isomers of BHC, three of DDT, five of aldrin, three of dieldrin, two of heptachlor, and three of chlordane with different *Rf* values could be identified in the technical products. Satisfactory reactions were also obtained with a 0.5% solution or Rhodamine B in ethanol. A potassium permanganate reagent gave positive reactions with one each of the aldrin and dieldrin isomers, both heptachlor isomers, and two of the chlordane isomers, and failed to give reactions with all other compounds tested.

73-0251. Parys, J. (Dept. of Food Investigation, Nat. Inst. of Hyg., Warsaw, Poland). **Metoda oznaczania *p,p'*-DDT, jego metabolitow *p,p'*-DDE i *p,p'*-DDD oraz γ-HCH i *p,p'*-metoksychloru (*p,p'*-DMDT) w oleju rzepakowym i w mleku. [A method for the determination of *p,p'*-DDT, its metabolites *p,p'*-DDE and *p,p'*-DDD, lindane, and *p,p'*-methoxychlor (*p,p'*-DMDT) in rapeseed oil and in milk.]** *Rocz. Panstw. Zakl. Hig. 22(4): 441-448; 1971.* (20 references) (Polish)

The method consists of extraction with acetonitrile from ether extracts of milk or from rape oil dissolved in petroleum ether. The acetonitrile extract is then diluted with a 2% solution of sodium sulfate and reextracted with petroleum ether. The remaining impurities are removed by aluminum oxide column chromatography and insecticides eluted with petroleum ether. After concentration of the eluate to 3-5 ml by heating in a water bath at 40° under a stream of air, the insecticides are detected by thin-layer chromatography on silica gel using a mixture of *n*-hexane and ethyl ether (95:5 or 97:3 depending on temperature of environment) as the mobile phase. Best detection was achieved when chromatograms were sprayed with freshly prepared Kovac's reagent (silver nitrate solution and 2-phenoxyethanol in acetone) and then irradiated with a quartz lamp. The smallest amounts detected by this method were: 0.05 μg in standard solution, 0.2 mg/kg in rapeseed oil, 0.02-0.01 mg/kg in milk.

73-0252. Zadrozinska, J.; Piechocka, J. (Dept. of Food Investigation, Nat. Inst of Hyg., Warsaw, Poland). **Metoda oznaczania dichlorfosu w materiale roslinnym. [A method for the determination of dichlorvfos residues in vegetable material].** *Rocz. Panstw. Zakl. Hig. 22(6): 695-700; 1971.* (12 references) (Polish)

A rapid and simple method combining thin-layer chromatography with enzymatic detection for the determination of dichlorvos in cucumbers, lettuce, tomatoes,

spinach, carrots, mushrooms, wheat, rye, and wheat flour is described. Benzene was used for the extraction from vegetables and methylene chloride for extraction from grains and cereal. Chromatography was performed on silica gel and a mixture of benzene and ethyl acetate (3:2) was used as the mobile phase solvent (in a saturated atmosphere). After drying, the chromatograms were sprayed with enzyme solution (obtained from beef liver) and, after 1 hour incubation at 38°C, sprayed with naphthyl acetate containing blue dye. The spots were light yellow on a violet background. The size and intensity of color was compared to a standard. The *Rf* values were approximately 0.34, and the smallest amount of detectable insecticide varied, depending on materials, between 0.005 and 0.1 mg/kg.

73-0253. Piechocka, J. (Dept. of Food Investigation, State Inst. of Hyg., Warsaw, Poland). **Oznaczanie endosulfanu w truskawkach. [Determination of endousulfan in strawberries.]** *Rocz. Panstw. Zakl. Hig. 22(6): 701-706; 1971.* (12 references) (Polish)

A quick and simple colorimetric method which can be used for routine detection of endosulfan residues is described. After addition of varying amountss (5-50 μg/100 g) to frozen strawberries (either whole or crushed fruit) the compound was extracted with *n*-hexane, hydrolyzed to sulfur dioxide, converted to a color complex with pyridine, and measured in a colorimeter at 520 nm. The method permitted detection of 0.05 mg/kg after extraction from the surface of strawberries, and 0.1 mg/kg after extraction of crushed fruit. The recovery yield from the surface was 90% at the 0.5 mg/kg and 71.3% at the 0.05 mg/kg level. Recovery from crushed strawberries was 60.4% at the 0.5 mg/kg and 56.8% at the 0.1 mg/kg level.

73-0254. Zadrozinska, J. (Dept. of Food Investigation, Nat. Inst. of Hyg., Warsaw, Poland). **Oznaczanie malationu i malaoksonu w owocach i warzywach. [Determination of malathion and malaoxon in fruits and vegetables.]** *Rocz. Panstw. Zakl. Hig. 23(1): 25-28; 1972.* (17 references) (Polish)

A rapid and simple method for the determination of these compounds in apples, cherries, tomatoes, cabbage, and spinach is described. The insecticides were extracted with benzene, extracts purified with active charcoal, and residues determined by means of thin layer chromatography on silica gel using a benzene-ethyl acetate mixture (9:1) as solvent. The *Rf* values for malathion were 0.6, for malaoxon 0.1. Two methods for spot development were used and compared: 1) chemical using Congo Red and 2) enzymatic using beef liver extract and β naphthyl acetate giving light yellow spots on violet background. The latter permitted detection of as little as 0.05-1.0 mg/kg of malathion and 0.01-0.20 mg/kg of malaoxon (depending on material tested with smallest amounts detectable in apples and cherries, larger amounts in spinach). The chemical method was much less sensitive with a detection range for malathion of 1.0 mg/kg (apples and cherries) to 10.0 mg/kg (spinach) while malaoxon could only be detected by this method in amounts greater than the permitted tolerance limits.

73-0255. Syrowatka, T., Jurek, A. (Dept. of Sanit. Toxicol., Nat. Inst. of Hyg., Warsaw, Poland). **Metody oznaczania hamowani aktywnosci cholinesterazy w zatruciach karbaminianami. [Methods for the determination of cholinesterase inhibition after carbamate poisoning].** *Rocz. Panstw. Zakl. Hig. 23(1): 85-93; 1972.* (20 references) (Polish)

A single dose of propoxur (130 mg/kg as oil emulsion), carbaryl (500 mg/kg as oil emulsion), or oil alone (controls) was introduced intragastrically into groups of Wistar rats. Cholinesterase activity in whole blood and brain tissue was determined by the following three methods: a slightly modified spectrophotometric method of Ellman using acetylcholine as substrate; eletrometric method (Δ pH) of Frawley, colorimetric method of Pilz. Comparative statistical analysis of results indicated that only Ellman's method, which showed approximately 50% inhibition of cholinesterase activity in intoxicated animals as compared to controls, is adequate for determination of cholinesterase activity in carbamate poisoning.

73-0256. Piekacz, H.; Mazur, H. (Panstwowy Zaklad Higieny, Warsaw, Poland). **Kolorymetryczne oznaczania pozostalosci malationu w zbozu i produktach zbozowych. [Colorimetric determination of malathion residues in grain and grain products.]** *Roczn. Panst. Zakl. Hig. 22(4): 431-439; 1971.* (11 references) (Polish)

Malathion residues in rye and wheat grain, rye meal, and bread were determined using a colorimetric method. The detection of as little as 1 mg/kg (50 μg in a 50-g sample) with a precision ranging from 0.17% to 8.08% depending on the product tested was possible. The procedure consisted of extraction with carbon tetrachloride, conversion into dimethylphosphorothioldithionate with ethanol and sodium hydroxide, and formation of a yellow copper complex soluble in carbon tetrachloride. The intensity of color was measured in the "Spekol" spectrophotometer at 418 nm. The average recovery rate of malathion differed depending on product: 81.8-93.9% for rye; 95.5-98.4% for wheat grain; 78.2-98.4% for rye meal; 91.5-93.6% for dry bread; 86.2-91.8% for fresh bread. Greatest accuracy was obtained with the colorless wheat and bread extracts, while the yellowish extracts from rye and rye meal formed an emulsion which made precise determination more difficult. The method could not be used for wheat flour due to the formation of a strong emulsion which caused a 50-80% loss of the pesticide.

See also **73-0124** **73-0125** **73-0165**

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